







# EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Chief, Office of Experiment Stations.*  
Associate Editor: H. L. KNIGHT.

## EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—SYBIL L. SMITH.  
Meteorology, Soils, and Fertilizers {W. H. BEAL.  
J. D. LUCKETT.  
Agricultural Botany, Bacteriology, and Plant Pathology {W. H. EVANS, Ph. D.  
W. E. BOYD.  
Field Crops—J. D. LUCKETT.  
Horticulture and Forestry—E. J. GLASSON.  
Economic Zoology and Entomology—W. A. HOOKER, D. V. M.  
Food and Human Nutrition {C. F. LANGWORTHY, Ph. D., D. Sc.  
LOUISE B. FRITCHETT.  
Animal Husbandry, Dairying, and Dairy Farming {D. W. MAY.  
M. D. MOORE.  
Veterinary Medicine {W. A. HOOKER.  
SYBIL L. SMITH.  
Rural Engineering—R. W. TRULLINGER.<sup>1</sup>  
Rural Economics—E. MERRITT.  
Agricultural Education {A. DILLE.  
MARIE T. SPETHMANN.  
Indexes—AMELIA B. DEANS.

## CONTENTS OF VOL. 39, No. 6.

	Page.
Recent work in agricultural science.....	501
Notes .....	503

## SUBJECT LIST OF ABSTRACTS.

### AGRICULTURAL CHEMISTRY—AGROTECHNY.

Sanitary and applied chemistry, Bailey .....	501
Chemical study of the fruit of <i>Camelia drupifera</i> , Bouvelot.....	501
Determination of indigestible residue from wheat and its products, Devillers..	501
Determination of indigestible residue from wheat and its products, Devillers..	502
Approximate analysis of the seed of the common pigweed, Harding and Egge..	502
Effect of heat on the citric acid content of milk, Sommer and Hart.....	502
The properties and composition of oocytin, Clark.....	502
A differential refractometer, Shook.....	502
A new form of colorimeter, Bock and Benedict.....	503
Acidimetry of colored solutions: Application of pocket spectroscopes, Tingle..	503
Abnormalities in the formal titration method, Jodidi.....	503
The inhibition of foaming, Fiske.....	503
Rapid pressure method for carbon dioxide in carbonates, Chapin.....	503
Reporting moisture results, Noyes.....	504
Determination of lime and phosphoric acid in peat soils, Rost and Clapp.....	504

<sup>1</sup> On leave of absence for military service.

Aids in commercial analysis of oils, fats, and their products, Pickering.....	
A modified acetic acid reagent for Valenta tests, Parkes.....	
Note on the acidity of castor oil of Indo-Chinese manufacture, Rosé.....	
Determination of essential oils in nonalcoholic flavoring extracts, Boylston.....	
Determination of coumarin in factitious vanilla extracts, Wichmann.....	
Practical laboratory apparatus—filtering rack for sugar solutions, Hines.....	
A simple salt test, Bouska.....	
The identification of the cinchona alkaloids, Wherry and Yanovsky.....	
Analysis of dyestuffs and their identification in foodstuffs, etc., Green.....	
Uniform nitrogen determination in cottonseed meal, McHargue.....	
Determination of acetic acid by distillation with phosphoric acid, Munni.....	
Alkalinity and acidimetry of chlorinated solutions, Mestrezat.....	
Determination of chlorin in the presence of organic matter, Sirot and Jaro.....	
Rapid method for determination of iron in small quantities of blood, German.....	
The preparation and testing of pure arsenious oxid, Chapin.....	
Arsphenamin and neo-phenamin, Myers and Duméz.....	
A contribution to the composition of lime-sulphur solutions, Winter.....	
A process for deodorizing fatty oils, Schuck.....	
Investigations on the sulphitation process, Zerbán.....	
The deterioration of sugars and principal factors affecting same, Owen.....	
The deterioration of cane sugars in storage; its causes and control, Owen.....	
Manufacturing sorghum sirup, Thorne.....	
Starch from flowering tubers, Verkade.....	
German substitute for jute.....	
A chemical process of peeling peaches, Newman and Freeman.....	
Scientific research in the canning industry, Bigelow.....	
Home canning: One-period, cold-pack method, McNeill.....	
Evaporation of fruits and vegetables in the home, Barsa.....	

#### METEOROLOGY.

A new seasonal precipitation factor of interest, Harper.....	
Further study of halos in relation to weather, Martin.....	
Monthly Weather Review.....	
Meteorological observations, van der Elst.....	

#### SOILS—FERTILIZERS.

Soil conditions and plant growth, Russell.....	
Surface geology of Michigan, Leverett.....	
The effect of cattle on the erosion of canyon bottoms, Duce.....	
Soil survey of Jasper County, Ga., Long and Carr.....	
Soil survey of Box Butte County, Nebr., Hayes and Agee.....	
Soil survey of Yates County, N. Y., Maxon.....	
On the origin of "terra rossa" (red soil) in Italy, Gortani.....	
Soil acidity. —I. Its relation to the growth of plants, Truog.....	
Action of neutral salts on humus and other experiments, Gillespie and Wheeler.....	
Value of litmus paper from different sources for soil acidity, Karraker.....	
Production of carbon dioxide and ammonia by soil organisms, Netter.....	
The carbon dioxide content of soil air, Bizzell and Lyon.....	
The gases of swamp rice soils, Harrison and Subramania Aiyer.....	
Lysimeter experiments, 1910 to 1914, inclusive, Lyon and Bizzell.....	
Tests of an "all crops" soil inoculum, Emerson.....	
On making and storing farmyard manure, Russell and Richards.....	
Nitrification of manure in the field, Barthel.....	
Why not fertilize in the hill? Thorne.....	
Absorption and nitrification of ammonium compounds in soil, Münster.....	
Trials with open-hearth basic slag and rock phosphates, Robertson.....	
Reverted phosphate, James.....	
The phosphate production and resources of the world, Morgan.....	
Awards for the location of workable phosphatic deposits in Germany.....	
The collection of kelp in the United States for potash production.....	
Influence of gypsum upon the solubility of potash in soils, McMiller.....	
Analyses of county limestone deposits, Ames.....	
Agronomic study of several compounds used in agriculture, de Wilkes.....	

	Page.
Sulphuric acid and fertilizer industries.....	522
Use of Philippine composts, Sarao.....	523
Water hyacinth as a fertilizer, Finlow and McLean.....	523
Water hyacinth as a source of potash, Day.....	523
Waste fertilizer.....	524
Uses of fertilizing materials for Illinois farms, Hopkins and Bauer.....	524

## AGRICULTURAL BOTANY.

Calorimetric chemical photometer for plant physiological research, Ridgway.....	524
Requirements for young and mature buckwheat plants, Shive and Martin.....	524
Origin of inulin in plants, Colin.....	524
Germination and catalase activity in sweet corn, Appleman.....	524
Resistance of plants to cold, I, Pantanelli.....	525
Plant succession in the thorn veld, Bews.....	525
Sap elaborated by wild plants on domesticated plants, Campbell.....	525
Nutrition of green plants by means of organic substances, I, Ravenna.....	526
Influence of some organic substances on plants, II, Ciamician and Ravenna.....	526
Effect of some organic substances in plants, VIII, Ciamician and Ravenna.....	526
Behavior of some organic substances in plants, IX, Ciamician and Ravenna.....	526
Effect of minerals on germination of peas, Maquenne and Demoussy.....	526
Effect of salts of various metals on germination, Maquenne and Demoussy.....	526
Modalities of ear in corn by treatment of seed with copper, Jungelson.....	526
Effect of tobacco smoke and methylhyd vapor on microorganism, Ludwig.....	527
Measurement in analysis of variation, Brotherton, jr., and Bartlett.....	527
Mutations of <i>Oenothera suaveolens</i> , de Vries.....	527
Results from planting wild fig, Longo.....	527
Studies on polyembryony, Longo.....	527
Studies on the floral parts and genesis of the medlar, Piercepoli.....	527
Analysis of epidermal cells in the leaf of <i>Iris germanica</i> , Guillaumond.....	528
Sexed cycles in <i>Gymnoconia peckiana</i> , Atkinson.....	528

## FIELD CROPS.

Report of field crops work in Louisiana, 1917, Hester and Quereau.....	528
Woburn field experiments, 1916, Voelcker.....	529
Stock and grain farming, Williams.....	531
Breaking up grass land in England and Wales in 1916-17, Middleton and White.....	531
Breaking up of grass land, Middleton.....	531
Prevalence of metaphasic variation in grasses and its significance, Dufrenoy.....	531
Grasses and leguminous crops in New York State.....	532
Summer forage crops, Williams.....	532
Seeding cover crops for fall planting, Welton.....	532
Experiments for 1919: Fall-sown wheat and rye.....	532
Plantation cereal of ancient America, Safford.....	532
Agricultural species of bent grasses, Piper and Billman.....	533
Production and utilization of barley, Harlan.....	533
Influence of position of grain on cob on maize seedlings, Halsted and Owen.....	533
Stalk cotton culture in Louisiana, Arkansas, and North Carolina, Carden.....	534
Potato breeding, Newman and Leonian.....	534
Variation in the potato blossom, Lundberg.....	535
Potato experiments and variety studies, Johnson and Ross, jr.....	535
Biological basis for the preparation of potatoes for seed, Appleman.....	536
Production of potatoes from potato skins, Castaldi.....	537
Potato in Canada: Its cultivation and varieties, Macoun.....	537
Fertilizer experiments with rice, de Jong and van Rossum.....	537
Grain sorghums in the San Antonio district of Texas, Lettner.....	537
Wet season sorghum grain, Ball and Rothgeb.....	538
Outline about sugar: History, growth, manufacture, and distribution, Polpin.....	538
Loss of canes damaged by fire, Ulrich.....	538
Wet potato storage, Thompson.....	538
Green seed, Jensen.....	538
Field beans, Tracy and Coe.....	539
Apple vetch, McKee.....	539
Color classification of wheat.....	539
New wheat for Kansas, Jardine.....	539

Fertilizing the wheat crop, Thorne.....	Fig.
Wheat experiments, season 1916, Richardson.....	7
The handling and storage of spring wheat, Bailey.....	14
Seed tests made at the station during 1916 and 1917, Munn.....	21
Some farm weeds of Sind, Kazi.....	21

## HORTICULTURE.

American horticulture, Molon.....	22
Proceedings of the American Society for Horticultural Science, 1917.....	22
[Report of horticultural investigations].....	22
Care of the garden in hot weather, Lloyd.....	23
Some tests of garden vegetables in Singapore, Baker.....	24
Percentages of nitrogen in tops and roots of head lettuce plants, Noyes.....	24
Home fruit grower, Kains.....	24
Marketing berries and cherries by parcel post, Hawbaker and Burnmeister.....	24
Newer varieties of strawberries, Taylor.....	24
Further studies of rots of strawberry fruits, Stevens and Wilcox.....	24
Influence of the annual shoot pruning on the vitality of the plant, Mer.....	24
Results obtained in Italy from the sowing of caprifig seed, Longo.....	24
Diseases and pests of cacao in Ecuador and cultivation of cacao, Rorer.....	24
[Oil content of coconuts on heavy clay soil], Harrison and Andersen.....	24
Some effects of shading lemon trees, Shamel et al.....	24
A maturity standard for citrus fruits, López.....	24
Sanitary precautions in grove and packing house, Helton.....	24
Growing medicinal plants in America, Cushman.....	24
Sequence of first blooming of rose collection, spring of 1918, Sexton.....	24
The small place: Its landscape architecture, Rehmann.....	24

## FORESTRY.

Miscellaneous conifers of the Rocky Mountain region, Sudworth.....	24
Utilization of elm, Brush.....	24
Investigation of growth in natural second-growth teak woods, Beekman.....	24
[Report on ornamental and economic trees], Bancroft.....	24
Woodlot improvement and the production of firewood, Taylor.....	24
Forest forestry in Virginia, Jones.....	24
The forests of Alexandria County, Va., Dunwoody.....	24
The forests of Nottoway County, Va., Marckworth.....	24
The forests of Chesterfield County, Va., Marckworth.....	24
Report of the State firewarden, Wilber.....	24
Forest fires in Canada, 1914, 1915, and 1916, Dwight.....	24
Forest legislation in Canada, 1917-18.....	24
Forestry in Sweden, Amilon.....	24
Report of forest administration in United Provinces for 1916-17, Clutterbuck.....	24
Report on forest administration of Central Provinces for 1916-17, Hill.....	24
Report on forest administration in Andamans for 1916-17, Cavendish.....	24
Forest administration in Ajmer-Merwara, 1916-17, Sambhoo Datt Joshee.....	24

## DISEASES OF PLANTS.

A list of plant diseases of economic importance in Indiana, Pipal.....	24
Additions to list of plant diseases of economic importance in Indiana, Osner.....	24
Work connected with insect and fungus pests and their control.....	24
Recent developments in spraying, Carmody.....	24
Comparative efficiency of basic and acid copper sprays, Capus.....	24
A new formula for Bordeaux, Sanders.....	24
Dusting v. spraying in Nova Scotia, Murphy.....	24
Dusting experiments in 1917, Stewart.....	24
Dusting as means of disease and insect control, Sheldon.....	24
<i>Cronartium coleosporioides</i> on <i>Pedicularis grandiflora</i> , Weir and Hubert.....	24
The mosaic disease of <i>Phytolacca decandra</i> , Allard.....	24
Two new species of <i>Pestalozzia</i> in Tuscany, Savelli.....	24
Rusts of Hamilton and Marion Counties, Indiana, Wilson.....	24
Field conference of cereal pathologists, Hungerford.....	24
Effect of hydrogen peroxid in preventing smut of wheat and oats, Pipal.....	24

	Page.
Longevity of <i>Helminthosporium teres</i> , Bakke.....	544
Means of controlling stalk disease of wheat, Herbert and Devaux.....	549
Endemic forms of stem rust on wheat and rust resistance, Stakman et al.....	550
Ascomium on red clover ( <i>Trifolium pratense</i> ), Hofer.....	550
Warty blight and its prevention, Howitt.....	550
Warty rot of Solanaceæ on <i>Ricinus</i> , Smith and Goble.....	550
The nature of spinach blight and relation of insects, McClintock and Smith.....	550
Control of sugar cane and its control, Greenough.....	551
Sugar cane supply in Java sugar industry in relation to scab, Van Hattum.....	551
Scab of tobacco plants: Blue mold and a bacterial disease, Lamm and Smith.....	551
Spot blight of fruit trees, Breger.....	551
The causes of apple bitter rot infections, Roberts.....	551
Apple scab and its control, Whetzel.....	552
Controlling cherry leaf blight, Whetzel.....	552
The bacterial shot-hole of peach, Anderson.....	552
A parasitic malady of the vine, Gladwin.....	552
Marble and leaf droop of coconuts, Petch.....	552
Woes upon a market disease of limes, Wilson.....	553
Diseases injurious to the pecan, Matz.....	553
The causes of silver leaf, Petri.....	553
Woes on the overwintering of forest tree rusts, Weir and Hudett.....	553
The old flying action of <i>Cordophora cerebella</i> , Petri.....	553
New hosts for <i>Haemaphysylla larici</i> , Weir.....	554
Black canker of chestnut, Petri.....	554
Pathology and biology of <i>Blepharospora cantharidis</i> on chestnut, Petri.....	554
The parasite causing black canker of chestnut, Petri.....	554
Adelphodonia as a needle fungus, Hartley.....	554
White pine blister rust [in Maine], Wilkins.....	554
White pine blister rust, Eaton.....	554

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Fresh-water biology, Ward and Whipple.....	554
Extirpating predatory animals, Nelson.....	555
Events of Colorado in their economic relation, Burnett.....	555
Bibliography of British ornithology to end of 1912, Mullens and Ewbank.....	555
Generic terms proposed for birds during 1890 to 1900, inclusive, Richmond.....	555
Generic names applied to birds during 1901 to 1905, inclusive, Richmond.....	555
Generic names applied to birds during 1906 to 1915, inclusive, Richmond.....	555
New light on the status of <i>Empidonax traillii</i> , Oberholser.....	555
The woodpeckers of Colorado, Lincoln.....	556
The Avianthorophala of North American birds, Van Cleave.....	556
On the trematodes of Australian birds, Johnston.....	556
Parasitic trematodes from Kansas fresh water snails, O'Roke.....	556
Alveus of the endoparasites recorded as occurring in Queenland, Johnston.....	556
[Report of the] entomological branch, Burrell.....	556
Insects and their control in Antigua, Watts.....	556
Insects of economic insects in France, Noel.....	556
Annual report of the government entomologist, Cowley.....	556
Division of entomology, annual report, 1915-16, Tait-Sbury.....	556
Report of government entomologist for 1916-17, Ramakrishna Aiyar.....	557
A catalogue of the Lepidoptera, Wagner.....	557
Report of the assistant professor of entomology, Madan Mohan Lal.....	557
[Report of the] division of entomology, Jepson.....	557
Entomological notes, Froggatt.....	557
Important clover insects, Gossard.....	557
Insects of a citrus grove, Watson.....	557
Insects injurious to the pecan, Matz.....	557
Insect pests of basket willows, Fryer.....	557
Insects and the national health, Bruce.....	558
Progress report on damage to stored grain by insects, Russell et al.....	558
Fumigation with chlorpicrin, Moore.....	558
The biology of dragonflies (Odonata or Paraneuroptera), Tillyard.....	558
Grasshoppers, Guyton.....	558
Experiments on the physiology of digestion in the Blattidae, Sanford.....	558
Thysanoptera from St. Vincent, with descriptions of four new species, Dagnall.....	558



The southern green plant bug, Jones.....	140
A new corn insect from California, Drake.....	141
[The West Indian cotton stainer ( <i>Lysdircus delavayei</i> )].	141
<i>Toxoptera graminum</i> in the South, Luginbill and Beyer.....	142
<i>Crithidia euryophthalma</i> n. sp., from <i>Euryophthalmus coarctatus</i> , McColloch.....	143
African Aphididae, I-III, Theobald.....	144
Wild cochineal insects as prickly-pear destroyers, White-Haney.....	145
The pine scale ( <i>Leucaspis pini</i> ) in Argentina, Brèthes.....	146
A list of Uganda Coccidae, their food plants and natural enemies, Gowley.....	147
Status of introduced coccids in South Africa in 1917, Brain and Kell.....	148
Instructions for collecting and preserving valuable Lepidoptera, Sindelar.....	149
Sericulture in tropical countries, Fauchère.....	150
Female Lepidoptera at light traps, Turner.....	151
Partial disinfection of mulberry leaves in feeding silkworms, Sacchi.....	152
Notes on poisonous urticating spines of <i>Hemiteles olivaria</i> larvae, Caffey.....	153
The false tussock caterpillars on shade trees, Swaine.....	154
Descriptions of new Lepidoptera from Mexico, Dyar.....	155
The small cabbage moth ( <i>Plutella maculipennis</i> ), Gunn.....	156
The white-marked tussock moth and its control, Swaine and Sanders.....	157
Notes on the migration of the Hessian fly larvae, McColloch and Yuasa.....	158
Simple method of identifying Anopheles mosquitoes of Canal Zone, Lunn.....	159
Control of houseflies by the maggot trap method, Cory.....	160
The life history and habits of <i>Chloropoda glabra</i> , Parker.....	161
Second paper on Brazilian Muscoidea collected by H. H. Smith, Townsend.....	162
Effect of humidity on pupal duration and mortality of <i>Protophila</i> , Elwyn.....	163
A dipterous parasite of terrestrial isopods ( <i>Phyto melanocephala</i> ), Thompson.....	164
Some methods adopted for control of flies in Egyptian campaign, Davidson.....	165
The control of the clover flower midge, Creel and Rockwood.....	166
Controlling clover flower midge in Pacific Northwest, Creel and Rockwood.....	167
Observations on flies infecting meat or causing human myiasis, Fexler.....	168
Supplement to preliminary list of Coleoptera of West Indies, Leng and Munchler.....	169
The elm-leaf beetle ( <i>Galerucella luteola</i> ) in Spain in 1917, Pantin Cercocla.....	170
Carabidae injurious to the strawberry, Lesne.....	171
The cane grubs of Australia, II, Dodd.....	172
The habits and control of white grubs in Manitoba, Criddle.....	173
A possible factor in coconut-beetle control, Wester.....	174
The maize beetle ( <i>Heteronychus mashunus</i> ), Jack.....	175
Notes on <i>Elcoides trinotata</i> , Parke.....	176
Clover root borer, Stear.....	177
A new scolytid injurious to dried sweet potatoes in Jamaica, Samps.....	178
The cigarette beetle, Mackie.....	179
A new weevil pest of sweet potatoes in Jamaica, Marshall.....	180
Honeybees and honey production in the United States, Jones.....	181
Beekeeping and the war, Phillips.....	182
Transferring bees to modern hives, Sechrist.....	183
An unusual disease of honeybees, Carr.....	184
The natural enemies of <i>Chrysomphalus dictyospermi</i> , Malenotti.....	185
<i>Cusca luzonica</i> n. sp., a parasite of <i>Sehizaspis lobata</i> , Malenotti.....	186
Some hymenopterous parasites of importance in southern Brazil, Brèthes.....	187
Sex determination and biology of <i>Habrobracon brevicornis</i> , Whiting.....	188
On a braconid parasite of <i>Glossina</i> , Turner.....	189
Chalcidoidea bred from <i>Glossina</i> in the Gold Coast, Waterston.....	190
New species of bees of the genus <i>Andrena</i> , from equatorial Africa, Viereck.....	191
Contributions to our knowledge of the bee genus <i>Perdita</i> , Viereck.....	192
Notes regarding ticks found on farm animals in New Zealand, Reakes.....	193

## FOODS—HUMAN NUTRITION.

Nutrition and clinical dietetics, Carter, Howe, and Mason.....	194
Food guide for war service at home.....	195
The day's food in war and peace.....	196
The civilian war ration, Roth.....	197
The fundamental requirements of energy for proper nutrition, Lusk.....	198
Figures and facts on feeding, Race.....	199
Welfare and housing, Hutton.....	200
The diet of the negro mother in New York City, Hess and Ungar.....	201
Food control in the United States.....	202

	Page.
Control in Great Britain.....	560
Control in England.....	560
Control in France.....	560
Control and public health in Germany, Blot.....	560
Food supply of Russia, Sherman.....	560
Use as a source of water-soluble vitamin, Oslergue, Mardel, et al.....	560
Use of Neuchâtel and cream cheese diet, Matheson and Campbell.....	560
Food value of eulachon, Daughters.....	560
Commercial stocks of fish.....	560
Commercial stocks of canned goods.....	560
Stability of some seed oils, Holmes.....	560
Use of velvet-stemmed <i>Collybia</i> , a wild winter mushroom, S. et al.....	561
Use of substitutes in jelly making, Funnigan.....	561
Use of pools for the diabetic, Wardall.....	561
Experimental studies on creatin and creatinin, VIII, Rees et al.....	561
Case intoxications and injury of body protein, III, Vain.....	562
Present status of our knowledge of fatigue products, Scott.....	562

# ANIMAL PRODUCTION.

Genetics.—The rôle of selection in evolution, Casale.....	563
Use of egg and sperm in heredity, Conklin.....	563
Allocation of plasmas within the cell, I, II, Forbush.....	564
Sex determination and sex differentiation in mammals, I, Forbush.....	565
Control of the sex ratio, Hiddle.....	565
Use of velvet beans as feed, Tracy and Coe.....	565
Use of and grazing steers, Kerr.....	566
Feeding constituents excreted by two-year-old steers, Gray et al.....	566
Feeding hints to hog raisers, Vestal.....	566
Feeding crops, Kerr.....	567
Use of hog-breeding crate, Zeller.....	567
Food content of southern feeds and requirements of growing hogs, Kaup.....	567
Feeding cockerels for broilers, Shoup.....	567
Use of scrap and sour milk for egg production, Kempster and Morvey.....	567

# DAIRY FARMING—DAIRYING.

Use of alfalfa for milk production, Hayden.....	568
Relation between percentage of fat in cow's milk and the yield, Roberts.....	569
Antibiotic substances in milk and cultures of <i>B. anthracis</i> , Ford and Lawrence.....	580
Plan for controlling the milk supply of the small town, Weston, Jr.....	580
Feeding practices of Wisconsin and Minnesota creameries, Potts.....	580
Stability of prices and quality of creamery butter, Warner.....	581
Neuchâtel and cream cheese: Manufacture and use, Matheson and Campbell.....	581
Sterilized milk for cheese making, Dunne.....	582

# VETERINARY MEDICINE.

Ordinary post-mortem technique, Crocker.....	582
Use of parasites and human disease, Chandler.....	582
Observation of live stock by controlling animal diseases, Volder.....	582
Editor's short course in veterinary medicine, Iowa State College.....	582
Proceedings of Wisconsin in Veterinary Medical Association, Hadley.....	582
Report of the health of animals branch, Burrell.....	582
Report of Bengal Veterinary College and civil department, 1916-17, Smith.....	582
Stable-house reform, showing results of inquiries as to progress, Doolington.....	583
Stability of the Abderhalden reaction, Boldyreff.....	583
Use of and tryptic digestion products as culture mediums, Stickel and Meyer.....	583
Use of "medium" medium, a simple substitute for serum, Hinton.....	583
Immunologic properties of uveal pigment, Woods.....	584
Isolation, purification, and concentration of immune bodies, Kozlov.....	584
Antibodies and antibody circulating in large amounts, Ross and Robertson.....	584
Further studies on preservation of complement by sodium acetate, Khany.....	584
General occurrence of eosinophilias, Hadwen.....	585
Use of oil of chenopodium and antelmintic agents, Mall and Henshaw.....	585
Activity of certain widely used anti-gaics, Taylor and Austin.....	586

Investigations of forage poisoning in cattle and horses, Rusk and Grindley.....	2
Notes on larkspur eradication on stock ranges, Marsh and Clawson.....	3
On the life history of <i>Ascaris lumbricoides</i> , Stewart.....	4
Blackleg and hemorrhagic septicemia, Cary.....	5
Differentiation of the paratyphoid enteritidis group.—IV, Jordan.....	6
Studies on the paratyphoid enteritidis group.—V, Krumwiede, jr., et al.....	7
A note on the occurrence of Negri bodies, Cornwall.....	8
Action of ether on rabie virus, Remlinger.....	9
New species of spirochete isolated from a case of rat-bite fever, Row.....	10
Demonstration of micrococci in the bones in rickets and scurvy, Jackson.....	11
The X-ray appearances of trichiniasis, Gouldsbrough.....	12
Contagious abortion of cattle, Williams.....	13
John's disease, Sheather.....	14
Worm nodules in cattle.....	15
Common diseases of swine, Greer.....	16
Action of salvarsan on swine erysipelas bacilli in vivo, Bierbaum.....	17
Swine erysipelas in men, Svith.....	18
Necrobacillosis in swine, Graham.....	19
Necrobacillosis and its relation to hog cholera, Bowen.....	20
Lesions in spavin and their significance, Goldberg.....	21
Generalized sarcomatosis of the fowl, Kaupp.....	22

## RURAL ENGINEERING.

Irrigation by means of underground porous pipe, House.....	23
Efficiency in citrus irrigation, Eaton.....	24
Typical specifications for bituminous road materials, Hubbard and Reeve.....	25
Tractor experience in Illinois, Yerkes and Church.....	26

## RURAL ECONOMICS.

Agriculture and the land, Bosworth.....	27
The farm and the nation, Porter.....	28
Work of Office of Farm Management on land classification and tenure, Spillman.....	29
The utilization of land not in farms, Hibbard.....	30
Government aid and direction in land settlement, Mead.....	31
Farm management surveys.....	32
The Chicago milk inquiry, Duncan.....	33
A study of marketing conditions in the Salt River Valley, Ariz., Collins.....	34
Plan of Department of Agriculture for handling farm labor problems, Wilcox.....	35
The labor situation for fruit farmers, Harvey.....	36
Agricultural banking in the Delta of Burma, Dawson.....	37
Land and Agricultural Bank of South Africa.....	38
Cooperative farm implement societies, Wibberley.....	39
County organization for rural fire control, Metcalf.....	40
Farm household accounts, Funk.....	41
Monthly crop report.....	42
Acreage and live stock returns of England and Wales.....	43
Estimates of area and yield of principal crops in India, 1915-16.....	44
[Agriculture in Japan].....	45

## AGRICULTURAL EDUCATION.

Vocational teachers: What the land-grant colleges are doing, Jarvis.....	46
Report of committee on mobilization of high-school boys for farm service.....	47
Science for beginners, Fall.....	48
Outline for teaching agriculture in seventh and eighth grades, Colvin.....	49

## MISCELLANEOUS.

Thirtieth Annual Report of Louisiana Stations, 1917, Dodson.....	50
Thirty-first Annual Report of Nebraska Station, 1917.....	51
Monthly Bulletin of the Ohio Agricultural Experiment Station.....	52
Monthly bulletin of the Western Washington Substation.....	53

# LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

Stations in the United States.		U. S. Department of Agriculture.	
	Page.		Page.
Arizona Station:		Bul. 526, Experiments with Single	
Bul. 85, March 1, 1918.....	593	Stalk Cotton Culture in Louisi-	
California Station:		ana, Arkansas, and North Caro-	
Bul. 201, June, 1918.....	576	lina. P. V. Tardion.....	531
Bul. 202, June, 1918.....	594	Bul. 680, Miscellaneous Contests of	
Colorado Station:		the Rocky Mountain Region. G.	
Bul. 230, June, 1918.....	590	B. Sudworth.....	546
Florida Station:		Bul. 682, A Study of Prices and	
Bul. 147, May, 1918.....	553, 557	Quality of Creamery Butter. G.	
Bul. 148, June, 1918.....	557	P. Warber.....	581
Illinois Station:		Bul. 683, Utilization of Elm. W. D.	
Bul. 209, June, 1918.....	576	Brush.....	546
Bul. 210, June, 1918.....	586	Bul. 684, The Sources of Apple	
Bul. 222, June, 1918.....	530	Bitter-rot Infections. J. W.	
Bul. 223, June, 1918.....	524	Roberts.....	551
Bul. 224, June, 1918.....	542	Bul. 685, Honeybees and Honey	
Indiana Stations:		Production in the United States.	
Bul. 162, March, 1918.....	510	S. A. Jones.....	565
Thirtieth Ann. Rpt. 1917.....	509,	Bul. 686, Further Studies of the	
528, 576, 577, 598		Rots of Strawberry Fruits. N. E.	
Mar. Land Station:		Stevens and R. H. Wilcox.....	543
Bul. 212, February, 1918.....	536	Bul. 687, Digestibility of Some	
Bul. 213, February, 1918.....	562	Seed Oils. A. D. Holmes.....	571
Bul. 214, March, 1918.....	519	Bul. 688, Marketing Berries and	
Massachusetts Station:		Cherries by Parcel Post. C. V.	
Bul. 155, June, 1918.....	577	Hawbaker and C. A. Berwick.....	543
Nebraska Station:		Bul. 689, The Southern Green	
Thirty-first Ann. Rpt. 1917...	598	Plant Bug. T. H. Jones.....	558
New York Cornell Station:		Bul. 690, Marketing Practices of	
Memor. 12, June, 1918.....	517	Wisconsin and Minnesota Cream-	
New York State Station:		eries. R. C. Potts.....	580
Bul. 446, January, 1918.....	541	Bul. 691, Typical Specifications	
Bul. 447, February, 1918.....	543	for Bituminous Road Materials.	
Bul. 448, February, 1918.....	571	P. Hubbard and C. S. Reeve.....	591
Bul. 449, March, 1918.....	552	Bul. 692, The Agricultural Species	
Ohio Station:		of Bent Grasses. C. V. Piper and	
Bul. 327, July, 1918.....	578	F. H. Hillman.....	532
Bul. 328, July, 1918.....	531	Farmers' Bul. 942, Controlling the	
Monthly Bul., vol. 3, No. 6,	529,	Clover-flower Midges in the Pac-	
June, 1918.....	532, 551, 563, 598	ific Northwest. C. W. Grod and	
Monthly Bul., vol. 3, No. 7,		L. P. Rockwood.....	563
July, 1918.....	510,	Farmers' Bul. 960, Neufchatel and	
521, 532, 540, 546, 558, 598		Cream Cheese: Farm Manufac-	
South Carolina Station:		ture and Use. K. J. Matheson	
Bul. 195, June, 1918.....	534	and F. R. Cannack.....	570, 581
Bul. 196, June, 1918.....	510	Farmers' Bul. 961, Transferring	
Virginia Truck Station:		Bees to Modern Hives. E. L.	
Bul. 24, July, 1917.....	535	Sechrist.....	599
Washington Station:			
West. Wash. Sta. Mo. Bul.,			
vol. 6, No. 4, July, 1918..	577, 598		

*U. S. Department of Agriculture—Con.*

	Page.
Farmers' Bul. 962, Velvet Beans, S. M. Tracy and H. S. Coe.....	538, 575
Farmers' Bul. 963, Tractor Experience in Illinois. A. P. Yerkes and L. M. Church.....	591
Farmers' Bul. 964, Farm Household Accounts, W. C. Funk.....	594
Farmers' Bul. 965, Growing Grain Sorghums in the San Antonio District of Texas, C. R. Letticer.....	537
Farmers' Bul. 966, A Simple Hog-breeding Crate, J. H. Zeller.....	577
Farmers' Bul. 967, Purple Vetch, R. McKee.....	539
Farmers' Bul. 968, Cultivation and Utilization of Barley, H. V. Harlan.....	533
Farmers' Bul. 970, Sweet Potato Storage, H. C. Thompson.....	538
Farmers' Bul. 971, The Control of the Clover-Flower Midge, C. W. Creel and L. P. Rockwood.....	563
Farmers' Bul. 972, How to use Sorghum Grain, C. R. Ball and B. E. Rothgeb.....	538
Office of the Secretary:	
Circ. 108, Food Needs for 1919: Fall-sown Wheat and Rye.....	532
Bureau of Animal Industry:	
Notes on Larkspur Eradication on Stock Ranges, C. D. Marsh and A. B. Clawson.....	587
Bureau of Crop Estimates:	
Monthly Crop Report, vol. 4, No. 7, July 1918.....	594
Bureau of Markets:	
Food Surveys vol. 4—	
No. 10, July 8, 1918.....	570
No. 11, July 16, 1918.....	570
Bureau of Soils:	
Field Operations, 1916—	
Soil Survey in Georgia, Jasper County, D. D. Long and M. E. Carr.....	512
Soil Survey in Nebraska, Box Butte County, F. A. Hayes and J. H. Agee.....	513
Soil Survey in New York, Yates County, E. T. Maxson.....	513
Weather Bureau:	
U. S. Monthly Weather Review, volume 46—	
No. 3, March, 1918.....	511, 524
No. 4, April, 1918.....	511
Scientific Contributions: <sup>1</sup>	
Abnormalities in the Formol Titration Method, S. L. Jodidi.....	503
The Detection and Determination of Coumarin in Fictitious Vanilla Extracts, H. J. Wichmann.....	905

*U. S. Department of Agriculture—*

Scientific Contributions—Contd.	
The Identification of the Chona Alkaloids by Optical Crystallographic Measurements, E. T. Wherry and Yanovsky.....	
The Preparation and Testing of Pure Arsenious Oxide, R. Y. Chapin.....	
The Action of Neutral Salts of Humus and Other Experiments on Soil Acidity, I. J. Gillespie and L. E. Wilson.....	
A Forgotten Cereal of America, W. E. Safford.....	
The Production of Self-fertile Muscadine Grapes, C. Deering.....	
Some Correlations in Potatoes, W. Stuart.....	
Federal Point of View of Demonstration Work in Horticulture and Pomology, C. E. Close.....	
Report of the Committee on Score Cards for Vegetables, W. W. Tracy, sr.....	
Some Effects of Shading Large Trees, A. D. Siamel, U. S. Pomeroy, C. L. Dyer, and L. B. Scott.....	
The Mosaic Disease of <i>Phaseolus decussatus</i> , H. A. Allen.....	
Brown Rot of Solanaceous Ricinus, E. F. Smith and G. H. Godfrey.....	
Notes on the Overwintering of Forest Tree Rusts, J. R. Weir and E. E. Hubert.....	
Free-living Nematodes, N. A. Cobb.....	
Copepoda, C. D. Marshall.....	
Externminating Predatory Animals, E. W. Nelson.....	
New Light on the Status of <i>Empidonax traillii</i> , H. C. Oberholser.....	
Contribution to the Knowledge of <i>Toxoptera graminum</i> in the South, P. Luginbill and A. H. Beyer.....	
Female Lepidoptera as Light Traps, W. B. Turner.....	
Notes on the Poisonous Urticating Spines of <i>Hemiteles olivaceus</i> larvae, D. J. Caffrey.....	
Descriptions of New Lepidoptera from Mexico, H. G. Dyar.....	
Second Paper on Brazilian Muscoidea Collected by Herbert H. Smith, C. H. Townsend.....	

<sup>1</sup> Printed in scientific and technical publications outside the Department.

*U. S. Department of Agriculture—Con.*

Scientific Contributions—Contd.	Page.
Beekeeping and the War, E. F. Phillips.....	566
New Species of Bees of the Genus <i>Andrena</i> , from Equatorial Africa, in the American Museum of Natural History, H. L. Viereck.....	566
Contributions to our Knowledge of the Bee Genus <i>Perdita</i> , H. L. Viereck.....	566
Wool and Meat Substitutes in War Time, C. F. Langworthy.....	567
Fruits and Vegetables, Caroline L. Hunt.....	567
The Use of Locally-grown Products and the Development of a Near-by Food Supply, C. J. Brand.....	567
Conservation of Live Stock by Controlling Animal Diseases, J. R. Motler.....	582

*U. S. Department of Agriculture—Con*

Scientific Contributions—Contd.	Page.
Federal Aid for Tuberculosis Control, J. E. Gibson.....	582
Efficiency in Citrus Irrigation, F. M. Eaton.....	591
Work of the Office of Farm Management, Relating to Land Classification and Land Tenure, W. J. Spillman.....	592
A Study of Marketing Conditions in the Salt River Valley, Ariz., J. H. Collins.....	593
Plan of the Department of Agriculture for Handling the Farm Labor Problem, E. V. Wilson.....	597
Moles and Thrift Stamps, T. H. Schenck.....	598



## EXPERIMENT STATION RECORD.

Vol. 39.

ABSTRACT NUMBER.

No. 6.

### RECENT WORK IN AGRICULTURAL SCIENCE.

#### AGRICULTURAL CHEMISTRY—AGROTECHNY.

Domestic and applied chemistry, E. H. S. BAILEY (*New York: The Macmillan Co.*, 4. ed., rev., pp. 394).—This edition, like the previous ones (11, S. R., 1905), treats of the chemistry which pertains to the daily life of the householder. The chapters on purification of water supplies and sewage disposal have been brought down to date, and chapters on textiles and poisons and their uses have been added.

Contribution to the chemical study of the fruit of *Camellia drupifera*. BOUASSER (Bul. Écon. Indochine, n. ser., 21 (1918), No. 129, pp. 231-234).—Analytical constants are given of the oil, press cake, and whole seed of *Camellia drupifera*. The oil obtained by pressing in the cold was limpid after filtration, very transparent, and of a golden yellow color and a sweet and agreeable taste and odor. Chemical constants were as follows: Acid number in percentage of oleic 136, saponification number 194.48, iodine number 82.82, Reichert-Meissl number 0.22, and unsaponifiable insoluble fatty acids 93.79. The oil contained alcohols and cyanogen compounds but traces of the glucosid saponin. The author considers that the oil would be suitable for soap making and, if the saponin were removed, would make an excellent table oil. The press cake could be used to advantage as a fertilizer, particularly as the saponin which in it is toxic for the larvae of insects.

Determination of the indigestible residue from wheat and its milling and baking products by the action of pancreatin in vitro, L. DEVIÈRES (Compt. Rend. Acad. Sci. [Paris], 166 (1918), No. 17, pp. 799-792).—The method employed is as follows:

One gm. of the product to be digested, 1 gm. of sodium borate, 0.3 gm. of distilled calcium chlorid, 0.025 gm. of pancreatin (Defresnes), and 100 cc. distilled water are mixed and digested at 55° C. for three hours. The temperature is gradually raised to 70°, and then rapidly to 120° in the autoclave. The mixture is cooled to 55°, a second portion of 0.025 gm. of pancreatin added. The digestion continued until a blue color with iodine is no longer produced. Excess hydrochloric acid is added to furnish 1.75 gm. of free acid per kilogram of the liquid. After standing an hour at 35 or 40° the mixture is filtered and the residue washed and weighed.

The following results are given of analyses according to this method, the digestible matter being calculated as percentage of the product dried at 105° to 110°: Wheat—Australian, 8.26; Plata, 9.06; Red Winter, 10.33;



dark hard, 10.66; and Manitoba, 11.48. Bran (thirds), 35.22. Flour (exp. and substitutes)—A, April, 1918, Paris, 8.17; B, April, 1918, Vincennes, 7.73. Bread—From flour A, 8.24; from flour B, 7.53.

Determination of the indigestible residue from wheat and its milling baking products by the action of pancreatin in vitro. L. DEVIEN. *Pharm. et Chim., 7. ser., 18 (1918), No. 1 pp. 5-17*.—This is a more detailed description of the methods noted above.

A proximate analysis of the seed of the common pigweed, *Amaranthus retroflexus*, E. P. HARRING and W. A. EGGE (*Jour. Indus. and Engin. Chem., 1918, No. 7, pp. 529, 530; abs. in Chem. Abs., 12 (1918), No. 16, p. 1672*). Seeds of varying degrees of maturity were stripped from plants growing in Minnesota and were cleaned by removing foreign matter and chaff. The seeds were rapidly ground to 20-mesh size and the moisture determined on a portion representing the total moisture in the seeds. The rest was air-dried for seven days and then ground to a 72-mesh size. The analytical data are as follows:

*Proximate analysis of pigweed seed.*

Constituents.	20-mesh as received.	72-mesh air-dried.	Oven-dried.	Per cent.
	Per cent.	Per cent.	Per cent.	Per cent.
Moisture.....	11.28	8.60	4.88	
Ash.....	4.33	4.46	7.92	
Oil (ether-extract).....	7.03	7.24	20.95	
Protein.....	18.57	19.13	33.59	
Starch.....	32.40	33.59	40.98	
Starch (acid conversion).....	39.77	40.98	44.88	

Effect of heat on the citric acid content of milk. Isolation of citric acid from milk. H. H. SOMMER and E. B. HART (*Jour. Biol. Chem., 35 (1918), pp. 313-318*).—The citric acid content of milk and the effect of heat on this were investigated with the idea of correlating the results with the alleged production of scurvy or Barlow's disease in infants fed heated milk.

Citric acid was found to the extent of approximately 0.2 per cent of the milk or 2 per cent of the milk solids. It was not destroyed in the heating of milk even in the autoclave at 15 lbs. pressure for one hour. The citric acid of milk were not changed to an insoluble form on heating.

The properties and composition of oocytin. G. W. CLARK (*Jour. Biol. Chem., 35 (1918), No. 2, pp. 253-262*).—The author reports a more complete study of oocytin, which was prepared from blood by methods similar to those employed by Robertson (*E. S. R., 26, p. 877*). Tables are given of the elementary composition of the product and of its effects upon sea urchins' eggs. The following conclusions are drawn:

"The elementary analysis shows that oocytin, prepared as described, is a chemical individual. Protein material is a constituent of oocytin. The products of hydrolysis of oocytin include purin bases (hypoxanthin) and a carbohydrate radical (pentose). Phosphoric acid is, however, only present in insignificant traces. Oocytin is neither hemolytic, bactericidal, nor identical with alexin. The active constituent is destroyed by heat at a temperature between 73 to 80° C., and by prolonged contact with alcohol. The fertilizing and cytolytic action of oocytin is attributed to the glucosidal structure of nucleosides, which are probably the active constituents of the preparation."

A differential refractometer. G. A. SHOOK (*Jour. Indus. and Engin. Chem., 10 (1918), No. 7, pp. 553, 554, figs. 2*).—The instrument was devised for the purpose of measuring the difference in refractive index between two liquids.

of the Abbé type, but so constructed that two liquids may be examined simultaneously, and if the index of one is known and both have the same temperature coefficient the index of the other may be accurately determined without knowing its temperature. The instrument is shown diagrammatically and described in detail. It has been used by the author to measure the difference in index between hemolyzed and unhemolyzed blood, which depends upon the amount of hemoglobin present.

**A new form of colorimeter,** J. C. BOCK and S. R. BREXNER (*Jour. Biol. Chem.*, 1918, No. 2, pp. 227-230, pls. 3; *abs. in Chem. Abs.*, 12 (1918, No. 19, p. 300).—The colorimeter described has been devised to replace those of the Duboucq type. The costly and difficultly obtainable prisms employed in the Duboucq and other instruments have been replaced by mirrors. The illuminating mirror, which is made by plating finely ground glass, prevents direct vision of objects being visible in the reflecting mirrors, which are made by using ordinary microscope cover-slips. The standard solution is placed in a glass of known dimensions, thus obviating the use of a movable plunger. The test solution is placed in a movable cup reading from zero to a depth of 10 mm., allowing work with very small quantities. The manipulation of the instrument is described with illustrative diagrams.

The instrument in its present form is said to be adapted to nearly all colorimetric work and to give readings quite as sharp as those given by the best Duboucq instrument.

**The acidimetry of colored solutions: An application of the pocket spectroscope,** A. TINGLE (*Jour. Amer. Chem. Soc.*, 40 (1918), No. 6, pp. 873-879; *abs. in Chem. Abs.*, 12 (1918, No. 508, p. 280).—The spectroscope is considered by the author to be an efficient means of distinguishing the exact neutral point in colorimetric titrations in which the natural color of the solution masks the color of the indicator. The necessary concentration of most indicators is noted when they are to be used in connection with the spectroscope. The conditions under which cochineal, methyl orange, lacmoid, phenolphthalein, methyl red, litmus, and hematoxylin can be used with the spectroscope are noted.

**Anomalies in the formal titration method,** S. L. JOHAN (*Jour. Amer. Chem. Soc.*, 40 (1918), No. 7, pp. 1031-1035).—An interpretation is given of the anomalies incident to the formal titration method, such as the yielding of low results in the case of such amino acids as contain in their molecule only carboxyl groups only, too low results in the case of amino acids which contain also the amino group, too high or too low results in the case of amino acids which contain other groups in addition to amino and carboxyl, and low results in the case of diamino acids in which the distance of one amino group from the carboxyl plays a rôle as in lysin.

**Inhibition of foaming,** C. H. FISKE (*Jour. Biol. Chem.*, 35 (1918), No. 2, pp. 113-115; *abs. in Chem. Abs.*, 12 (1918), No. 19, p. 1977).—The factors incident to the inhibition of foaming are considered by the author to be high surface activity, high surface tension, high interfacial tension, low solubility, and stability. An efficient foam inhibitor complexer with these conditions has been found in isononyl isovalerate, or a mixture of this substance with isononyl acetate. Two methods of preparing this reagent are described.

**Rapid pressure method for the determination of carbon dioxide in carbonates,** W. H. CHAPIN (*Jour. Indus. and Engin. Chem.*, 10 (1918), No. 7, pp. 527-529, 1).—The principle of the method is as follows:

The carbonate is dissolved in dilute hydrochloric acid contained in a flask of known volume to which is attached a small mercury manometer. The change

in pressure is recorded, and by a simple calculation the weight and percentage of carbon dioxide are obtained.

The method of procedure is given in detail, together with a diagram of the apparatus. The accuracy is considered to be equal to that of the absorption method.

Reporting moisture results, H. A. NOYES (*Science*, n. ser., 47 (1915), No. 1212, pp. 293-295, fig. 1).—Attention is called to the confusion resulting from the varying practice of soil chemists and physicists in reporting results of moisture determinations in soils. Various ways of stating the results to avoid this confusion are suggested, as follows: "(1) Ratio of water to 100 parts of dry soil, (2) parts of water with 100 parts of dry soil under conditions specified, (3) moisture with 100 parts of dry soil, and (4) grams moisture per 100 gm. of dry soil."

Determination of lime and phosphoric acid in peat soils: Comparison of Jönköping with Bremen method, C. O. ROST and F. C. CLAPP (*Soil Sci.*, (1918), No. 3, pp. 213-218).—The authors at the Minnesota Experiment Station have compared two methods for the determination of lime and phosphoric acid in peat soils, viz. "the Bremen, in which the sample is incinerated and the ash extracted with aqua regia, and the Jönköping, in which an air-dry sample is extracted with 12 per cent hydrochloric acid. With the former larger amounts of iron and aluminum oxides, lime, and phosphoric acid are obtained, the difference with the first three constituents being small but that of the last very large. The smaller amount of lime found by the Jönköping method is due to part of the extracted being rendered insoluble in water in the course of the analysis and hence not included in the final precipitation. This unrecovered portion varies directly with the amount of iron present. Practically all of the phosphoric acid is recovered from the acid extract."

Aids in the commercial analysis of oils, fats, and their commercial products, C. F. PICKERING (London: Charles Griffin & Co., Ltd., 1917, pp. VIII+135).—This laboratory handbook describes commercial methods for the sampling and preparation for analysis of oils and fats and for their chemical examination. Special sections are devoted to the discussion and interpretation of analytical results obtained with commercial fatty oils, miscible castor oil, kerosene oils, sulphonated oils, neutral fats, fat splitting and distillation products, glycerine resins, and recovered products and their distillation products. Many tables are given of analytical data published for the first time. The limiting values of the tests for the oils, fats, and waxes of the British Pharmacopoeia are appended.

A modified acetic acid reagent for Valenta tests, A. E. PARKES (*Analyst*, 47 (1918), No. 504, pp. 82-86, fig. 1).—To obviate the difficulties often caused by the solidification of acetic acid during cold weather, the author suggests as a substitute reagent for the Valenta test a mixture of acetic acid of 99 per cent purity with about 10 per cent of propionic or butyric acid. To this is added water in small quantities (1 to 2 per cent is generally necessary) until the reagent gives the turbidity temperature required, using butter fat or other convenient fat or oil as a standard, or until it gives the same figure as pure acetic acid of some definite strength, preferably 99 per cent.

Note on the acidity of castor oil of Indo-Chinese manufacture, ROST (*Bull. Econ. Indochine*, n. ser., 20 (1917), No. 127, pp. 643-648).—As the castor oil which is used as a lubricant for aviation motors must be absolutely limpid and possess an acidity in oleic acid not exceeding 15 gm. per liter, investigations were conducted for the purpose of ascertaining the conditions under which such an oil could be prepared. Determinations of free acid in different samples of

oil showed that the acidity increases on standing unless the oil is heated for about 10 minutes. This would indicate that increasing acidity is due to the action of enzymes in the oil which are destroyed by heat. If the oil of the oil is followed by immediate filtration, an oil of the necessary degree of limpidity and acidity is easily obtained.

**The determination of essential oils in nonalcoholic flavoring extracts.** F. BOWLES (*Jour. Indus. and Engin. Chem.*, 10 (1918), No. 7, pp. 537-539; *abs. in Chem. Abs.*, 12 (1918), No. 16, pp. 1669, 1670).—The method which the author found most satisfactory for the determination of the essential oil in lemon, sage, and certain other extracts consists of making an alcoholic extract from the oil and proceeding according to the official method.<sup>1</sup> This method was unsatisfactory with peppermint extract, but distillation with steam gave good results. In the use of this method it is necessary to make a preliminary determination of the percentage of oil which can be recovered with the steam in blank experiments, using known quantities of pure oil.

**The detection and determination of coumarin in factitious vanilla extracts.** A. WICHMANN (*Jour. Indus. and Engin. Chem.*, 10 (1918), No. 7, pp. 535-537; *Chem. Abs.*, 12 (1918), No. 16, p. 1669).—A qualitative test for the detection of coumarin in vanillin extracts is described which can be conducted in 15 minutes, takes only 10 cc. of extract, and does not require decoloration or the use of complicated apparatus.

The method is based upon the change of coumarin to salts of coumaric acid by concentrated potassium hydroxid with the development of a yellow color. The sudden disappearance of the color indicates the conversion of the coumarin to a colorless salicylate. The method is described in detail, together with a gravimetric method for the quantitative determination of coumarin.

**Practical laboratory apparatus—filtering rack for sugar solutions.** C. W. WIS (*Philippine Agr. Rev. [English Ed.]*, 10 (1917), No. 4, pp. 431, 435, fig.).

The filtering rack described by the author was devised to obviate the delay in obtaining a clear filtrate in the preparation of sugar samples for polarimetric work.

The apparatus consists of a double filtering rack, each compartment containing a double row of holes. Beneath the back row of holes in both front and rear racks are placed small pans or troughs of galvanized iron which receive the first filtrate which passes. After the clear liquid has begun to pass through, the funnels are moved to the front row of holes and placed in clean beakers to receive the filtrate for polarization.

**A simple salt test.** F. W. BORSKA (*Jour. Dairy Sci.*, 1 (1917), No. 3, pp. 279-280).

A method of standardizing the silver nitrate solution for the determination of salt in butter is proposed. Briefly, the method is as follows: Dissolve 1 gm. of butter salt in exactly 0.5 pint of distilled water, place 9 cc. of this solution in a convenient container, and add enough potassium or sodium chromate solution to give a yellow color. Use an excessively strong preliminary silver nitrate solution, and dilute with the distilled water until it takes exactly 1 cc. of silver to titrate the salt solution to a brick-red color.

In the salt determination dissolve 10 gm. of a homogeneous sample of butter in 100 cc. of hot distilled water, draw out 9 cc. of this mixture by means of a pipette before the fat has risen to the top, and titrate with the standardized silver nitrate solution to a brick-red color. The percentage of salt is read directly from the burette. The salt test residues should be carefully saved and the remaining silver chloride recovered and sold.

<sup>1</sup> *Jour. Assoc. Off. Agr. Chem.*, 2 (1916), No. 3, p. 262.

The identification of the cinchona alkaloids by optical-rotation measurements. E. T. WHERRY and E. YANOVSKY (*Jour. Amer. Chem. Soc.*, 1918, No. 7, pp. 1963-1974, *figs.* 8).—The application of the optically-graphic method (E. S. R., 39, p. 415) to the cinchona alkaloids is described, and the properties of the cinchona alkaloids—cinchonin, cinchonidine, and quinidine—are presented in descriptions and in tabular form. The identity of an unknown alkaloid may be readily ascertained by following which the identity of an unknown alkaloid may be readily ascertained. The results obtained with mixtures are given, and the method of treatment of a medicinal preparation containing these substances is outlined.

The analysis of dyestuffs and their identification in dyed and colored materials, lake-pigments, foodstuffs, etc., A. G. GREEN (*London: Chemical & Co., Ltd.*, 1916, 2. ed., pp. XV+144, *figs.* 3).—The methods of analysis are, for the most part, the revised and completed results of a series of investigations conducted by the author, with the assistance of various collaborators, during the past 20 years. The volume also includes a short theoretical introduction, especially from the standpoint of dyestuff classification, and a chapter on the detection of azo dyestuffs.

Uniform nitrogen determination in cottonseed meal. J. S. McHARG (*Jour. Indus. and Engin. Chem.*, 10 (1918), No. 7, pp. 533-535; *abs. in Chem. Abs.*, 12 (1918), No. 16, p. 1671).—As a result of investigations regarding the lack of uniformity in the results of nitrogen determinations on cottonseed meal, the following conclusions are drawn:

"The chief source of irregularity in nitrogen determinations on cottonseed meal may be due to a lack of grinding the sample to a sufficient degree of fineness (40 mesh) to obtain a homogeneous mixture of hulls and meal for making out a charge. When mercury is used as the catalyst a digestion period of more than two hours of brisk boiling in an excess of sulphuric acid water causes a loss of nitrogen. When copper sulphate is used as the catalyst the digestion period will depend upon the amount of sodium sulphate added, being sufficient to bring about a complete digestion in two hours. The precipitation of the copper as sulphid facilitates the boiling and shortens the time of distillation. Sodium sulphate is as efficient as potassium sulphate in cottonseed meal digestions. The writer suggests the use of the following charge: 0.7005 gm. of cottonseed meal, 0.3 gm.  $\text{CuSO}_4$ , or 0.5 gm.  $\text{CuSO}_4$ , 50.0 gm.  $\text{Na}_2\text{SO}_4$ , 4-25 cc.  $\text{H}_2\text{SO}_4$ , and brisk boiling for two hours."

Determination of acetic acid by distillation with phosphoric acid. W. MUXX (*Jour. Indus. and Engin. Chem.*, 10 (1918), No. 7, pp. 559-561, *figs.* 1, 2).—The method described is a modification of the regular phosphoric acid distillation process. The principle of the method is the decomposition of the acetate by means of phosphoric acid, distillation of the acid vapors liberated, and collection in a known amount of a standard barium hydroxid solution which is then titrated back with standard acid.

The method has been used by the author particularly for determining acetic acid in calcium acetate residues and dry soda and sulphite liquors and has been found to have given in all cases excellent results.

Alkalinity and acidimetry of chlorinated solutions utilized in sewage treatment. Determination of free alkalis and of alkaline carbonates and bicarbonates. W. MESUREZAT (*Jour. Pharm. et Chim.*, 7, ser., 17 (1918), No. 8, pp. 259-260, *figs.* 1; *abs. in Chem. Abs.*, 12 (1918), No. 17, p. 1787).—It is suggested that the difficulty in determining the alkalinity or acidity of chlorinated solutions owing to the action of chlorine on the indicators employed may be overcome by the addition of sufficient 20 per cent hyposulphite solution to combine with

4. *Alin.* The alkaline or acid reaction of the solution is not appreciably modified, but the use of litmus and phenolphthalein is rendered possible. By combining the results furnished with these indicators in the cold in two successive titrations the amounts of free alkalis, of alkaline carbonates, and of bicarbonates may be determined.

The technique of the method is described in detail.

**Determination of chlorin in the presence of organic matter** (gastric juice, fresh blood and blood serum, and milk). *SUGAR and JOURN (Ann. Chim. Analyt., 1918, No. 5, pp. 109-113; abs. in Analyst, 43 (1918), No. 508, pp. 274, 275; Chem. Abs., 12 (1918), No. 17, pp. 1786, 1787).*—A comparison is reported of the results obtained in the determination of chlorin in organic substances by the usual method of ashing the sample with those obtained by simple coagulation of the organic matter by an appropriate reagent. Picric acid was used as a precipitant for gastric juice, sodium metaphosphate for blood and blood serum, and aceto-picric acid for milk. The results obtained by the two methods were similar in all cases, showing that the preliminary ashing is unnecessary.

**A rapid method for the determination of iron in small quantities of blood. *BERMAN (Jour. Biol. Chem., 35 (1918), No. 2, pp. 231-236; abs. in Chem. Abs., 12 (1918), No. 19, p. 1977).*—In the method described the iron held in combination in fluid blood is split off by the action of concentrated hydrobromic acid and oxidized by potassium permanganate which also destroys the organic matter. The resultant solution is mixed with a solution of ammonium sulphocyanate in water and acetone, and the color is compared with that of a standard iron solution similarly treated. The details of the method are as follows:**

To 0.04 cc. of blood, obtained by pricking the finger or ear lobe and measured in a calibrated pipette, 2 cc. of water, 0.2 cc. of  $\frac{N}{10}$  hydrochloric acid, and 2 cc. of  $\frac{N}{10}$  potassium permanganate are added. The mixture is placed on a water bath for about 2 minutes, when a brownish-red coagulum is formed above a colorless or slightly yellow fluid. Two drops of concentrated hydrobromic acid is added and the tube heated on the water bath for another 2 minutes. The solution is filtered through acid-washed filter paper into a long narrow graduate. Washings are added until the filtrate has reached the 5 cc. mark. Then 5N ammonium sulphocyanate is added to the 10 cc. and acetone up to 15 cc. The graduate is stoppered, the fluids are mixed, and acetone is again added to make up for the shrinkage in volume.

The standard is prepared by adding 2 drops of concentrated hydrobromic acid to 2 cc. of standard iron solution containing 0.009 mg. of iron per cubic centimeter, heating on a water bath for from 2 to 4 minutes, and then adding water, ammonium sulphocyanate, and acetone as in the sample. After both graduates are stood for 5 minutes, comparison is made in a Duboseq colorimeter.

The process is said to be rapid and accurate.

**The preparation and testing of pure arsenious oxid.** *R. M. CHAPIN (Jour. Res. and Engin. Chem., 10 (1918), No. 7, pp. 522-525).*—The ordinary purity tests for arsenious oxid, with certain modifications, are described. Two additional tests are included, a test for heavy metals and one for antimonious oxid.

For the former a solution of the sample prepared by dissolving 1 gm. of the powdered substance in 10 cc. of ammonium hydroxid (1 volume of ammonia—50 gr. 0.9—to 2 volumes of water) is mixed with fresh saturated hydrosulphuric water and heated. No precipitate, turbidity, or color other than a faint yellow should appear.

To test for antimonious oxid. the solution of the sample prepared as above is cooled in a test tube in ice water for 15 minutes. A turbidity indicates the presence of antimonious oxid. As small an amount as 0.15 per cent can be detected by this test.

A method of preparation of pure arsenious oxid by fractional crystallization is described in detail.

Some qualitative and quantitative tests for arsphenamin and nearsphenamin, C. N. MYERS and A. G. DUMÉZIL (*Pub. Health Rpts. [U. S.], 33 (1918), 1, 25, pp. 1003-1018*).—This article gives a description of qualitative tests for arsphenamin (salvarsan) and nearsphenamin (neosalvarsan) and a critical discussion of various quantitative methods for the determination of arsenic and the above and other organic compounds.

A contribution to the composition of lime-sulphur solutions, O. E. WISEMAN (*Jour. Indus. and Engin. Chem., 10 (1918), No. 7, pp. 539-545*).—The literature on the subject of the composition of lime-sulphur solutions is reviewed and discussed, particularly the work of Thompson and Whittier previously mentioned (E. S. R., 32, p. 410). Investigations conducted by the author at the Michigan Experiment Station are reported leading to the following summary:

"Compounds containing the (SH) radical, as hydrogen sulphid, calcium hydrosulphid, calcium hydroxyhydrosulphid, and the corresponding salts of other metals, may be detected in a lime-sulphur solution by comparing the titration of the solution with standard iodine to the disappearance of the yellow color with that when the end-point is determined by the use of nitroprussid of sodium. A 'straight' lime-sulphur solution does not contain an appreciable amount of any of the above-mentioned compounds. The difference between the titrations of a straight lime-sulphur solution with standard hydrochloric acid and standard ammoniacal zinc chlorid is a measure of the free lime in the solution. When an excess of lime is used in the preparation of a lime-sulphur solution and the solution is freshly prepared, or when recently diluted with limewater, it contains free lime; but, on standing, the free lime gradually disappears. Therefore an ordinary lime-sulphur solution can not contain free lime.

"When magnesium sulphate is added to a lime-sulphur solution the following may be noted: (1) There is a slight decrease in the monosulphid sulphur and the sulphid sulphur contents. (2) The thiosulphate sulphur content remains practically constant. (3) The magnesium replaces part of the calcium forming magnesium polysulphid, and under proper conditions calcium sulphate crystallizes out. (4) A compound containing the (SH) radical is formed.

"The magnesium sulphate method for determining free lime in a lime-sulphur solution is inaccurate. There appears to be no free sulphur in a lime-sulphur solution, and the sulphur that separates out on standing undoubtedly comes from the higher polysulphids. When a concentrated lime-sulphur solution is prepared with an excess of lime, orange-red needles separate out. The properties of these crystals indicate that they are the same as those described in the literature as Herschel's crystals and as being composed of calcium oxid combined with calcium polysulphid. Their analysis agrees most closely with that of Geuther, who gives for their formula the following:  $2\text{CaO} \cdot \text{CaS}_2 \cdot 11\text{H}_2\text{O}$ . However, it seems improbable that they exist in solution in the form indicated by this formula."

A process for deodorizing fatty oils, W. P. SCHUCK (*Metallurg. and Chem. Engin., 18 (1918), No. 11, pp. 698, 699*).—The method consists of blowing hydrogen through the heated oil in the same manner as in the hydrogenation of oil except that no catalyzer is present. The oil is not hardened but is rendered odorless and palatable. It is considered that the means whereby the deodor-

which is accomplished by this process are both physical and chemical. The color number is lowered somewhat, showing that partial hydrogenation has taken place. Oils so treated are said to have much better keeping qualities than steam-deodorized oil. Among the commercial possibilities of the process are the purification of fish oils and of fats which have been burned from common use in cooking, and the removal of taste and odor from medicinal cod liver oil.

It is stated that the use of the process as described in this article is protected by U. S. Patent No. 1,260,072.

**Investigations on the sulphitation process, F. W. ZERRAN (*Louisiana Stas. Rpt. 1917, pp. 9, 10*).—**This is a continuation of the study of decolorizers in sugar purification previously noted (*E. S. R.*, 37, p. 806).

It was found that natural vegetable substances, in order to furnish highly porous carbons, should either contain large amounts of infusion ash or else must first be impregnated with such or similar substances to serve as a skeleton in which the carbon particles are deposited in a finely divided state. The de-colorizing effect of the resulting carbon appears only after the impregnating substances have been removed by means of suitable solvents. Active carbons from natural sources have been prepared by charring the highly silicious parts of certain grasses, heating the char to high temperatures in the absence of air, and pelleting out the silica by boiling with caustic soda, preferably under pressure. In the artificial impregnation methods, highly active carbons were made from cherry pine or other sawdusts by charring them in a mixture with lime, waste of lime, etc., and then using hydrochloric acid to remove the impregnating substance after thorough carbonization. Zinc chlorid and stannous chloride were efficient impregnating substances, but the best carbon was made with anhydrous magnesium chlorid.

**A study of the deterioration of sugars and principal factors affecting same, W. L. OWAN (*Louisiana Stas. Rpt. 1917, pp. 10-12*).—**This is a continuation of work previously noted (*E. S. R.*, 37, p. 509).

Observations upon the changes in chemical composition of sugar samples showed that a solid nonsucrose moisture ratio of 3:1 (known as the factor of safety) does not invariably prevent a sugar from deteriorating, and that there is a successive increase and decrease in reducing sugars of the same sample at different periods of storage. A wide variation in the power of different organisms to destroy sucrose was obtained. The limit of sucrose concentration in which the cultures seem capable of inducing appreciable action is between 45 and 55° Brix. The low maximum density in which these bacteria are capable of developing suggests that their deteriorative action is largely confined to fairly moist sugars in which the molasses films have been diluted by the absorption of moisture. If the moisture content of the sugar is normal no deterioration results.

By the use of sucrose media of high concentration 17 species of torula were isolated. These organisms, however, had only a slight destructive action on sucrose, levulose, or dextrose. The most important causative agents in deterioration were the fungi, principally *Aspergilli*, which have a very destructive action even at a high concentration of sugar. The limit of density at which fungi are capable of rapid deterioration is 69° Brix, torula 64°, and bacteria 52°. The addition of nitrogen and ash nutrients does not markedly increase the activity of torula or bacteria or have much effect on the keeping qualities of sugar. The addition of such impurities as compounds of calcium reduces the activity of the microorganisms because of the effect upon the density of the solution.



In applying the results of these investigations to actual practice the importance of maintaining the composition of the molasses film is emphasized, and cold storage is specially necessary in preventing deterioration. Little profit results from the practice of disinfecting sacks.

**The deterioration of cane sugars in storage; its causes and suggested measures for its control**, W. L. OWEN (*Louisiana Stas. Bul.* 162 (1918), pp. 121).

This bulletin is a complete report of the author's investigations during the past nine years on sugar deterioration, preliminary reports of which have been published (see p. 509). The subject is discussed under the following topics: Observations upon the changes in the chemical composition of sugar samples in storage; microorganisms constituting the causative agencies in the changes in the composition of sugars in storage, the influence of the density of the molasses upon the deterioration of sugars, and the practical application of the results of the investigation to the conditions existing in the cane-sugar industry.

A bibliography of 30 titles is appended.

**Manufacturing sorghum sirup**, C. E. THORNE (*Mo. Bul. Ohio Sta.* 5 (1918), No. 7, pp. 213, 214).—Suggestions are given for handling the cane juice and finished product on a small and on a large scale.

**Starch from flowering tubers**, P. E. VERKADE (*Chem. Weekbl.*, 15 (1918), No. 14, pp. 427-434, figs. 3; *abs. in Chem. Abs.*, 12 (1918), No. 15, p. 1662). This article discusses the possibilities in the use of materials other than *typha* for the manufacture of starch. The materials considered by the author are the most practical for use in Holland are the tubers of the tulip, hyacinth, and narcissus. Individual characteristics of the starch obtained from these sources are described and diagrams are given of their microscopic crystalline forms.

**German substitute for jute** (*Agr. Jour. India*, 12 (1917), No. 2, pp. 324-325; *abs. in Nature [London]*, 99 (1917), No. 2493, p. 470).—Materials used in Germany to replace jute fiber in the manufacture of sacks and coarse textiles are briefly discussed. Waste paper and cellulose, previously noted (E. S. R., 28, p. 208), are described as war-time substitutes only, but *Epilobium hirsutum* and *Typha* fiber, which are said to have been developed on a commercial basis, are regarded more seriously. The claim is made that the successful production of *Typha* fiber will render Germany independent of importations of cotton, jute, and wool.

**A chemical process of peeling peaches**, C. C. NEWMAN and B. FREMAN (*South Carolina Sta. Bul.* 196 (1918), pp. 8, figs. 5).—The process consists of dipping the unwashed fruit in a 3 per cent solution of caustic soda and allowing it to remain from 1 to 2 minutes. Following this treatment the fruit is thoroughly washed to remove the loose peelings and all traces of the soda. It is claimed that by this process there is a considerable saving of fruit, the fruit retains all of its original flavor and firmness, and ripe soft fruit and small irregular fruit can be peeled as readily as the better specimens. The process is considered to be simple, sanitary, and economical and can be used successfully in the home, in the small cannery, and in the large commercial cannery. The only precaution necessary is to use only porcelain-lined or wooden vessels.

**Scientific research in the canning industry**, W. D. BIGELOW (*Jour. Franklin Inst.*, 186 (1918), No. 1, pp. 1-14).—This is a general description of the problems occurring in the canning industry.

**Home canning: One-period, cold-pack method**, ROBERTA McNEILL (*S. Dak. Col. Agr. Ext. Circ.* 4 (1918), pp. 8).—A brief manual of directions.

**Evaporation of fruits and vegetables in the home**, A. F. BARSS (*Oreg. Agr. Col. Ext. Bul.* 296 (1918), pp. 3-12, fig. 1).—This bulletin describes systems of drying or evaporating and gives directions for the construction and operation of

evaporators. Supplementary directions for the evaporation of various fruits and vegetables are included.

### METEOROLOGY.

A new seasonal precipitation factor of interest to geographers and agriculturists, R. M. HARPER (*Science, n. ser.*, 48 (1918), No. 1235, pp. 308-311).—A preliminary account is given of comparisons of early and late rainfall in the United States and of the suggested climatic soil and plant growth correlations. In closing this study "it was found that the most striking results were obtained by comparing the difference between the rainfall for April to June, inclusive, and that for August to October, inclusive, the former being good for the crops and the latter for the soil."

The data indicate that "nearly all our tornadoes occur in the region of considerable early summer excess of precipitation, and our hurricanes in that of considerable late summer excess, while regions where the difference is not more than one inch or two either way rarely suffer much damage from wind. Both for tornadoes and hurricanes usually occur during the period of greatest rainfall in the respective regions. The late summer rains commonly come in the form of showers in the daytime, while the early summer rain is more likely to fall gently at night...."

The most fertile soils are in the region where there is more rain in early summer than in late summer, and vice versa.... The regions of heavy late summer rains are characterized by poor sandy soils....

The distribution of vegetation types is of course correlated with the soil to a considerable extent," but "some correlations between seasonal rainfall and crops are easily made. Alfalfa, wheat, figs, and Upland cotton are not raised where the late summer rainfall exceeds that of early summer by more than 1 in., while sugar-cane, pineapples, grapefruit, and Sea Island cotton thrive where late summer rains prevail. But of course the soil has a great deal to do with this too."

Further study of halos in relation to weather, H. H. MARVIN (*U. S. Mo. Weather Rev.*, 46 (1918), No. 3, pp. 119, 129).—This article gives the results of observations in different parts of the United States as well as the author's observations at Columbus, Ohio, and discusses the possible relation between the results and latitude, longitude, and the average cyclonic tracks.

The general conclusion is "that the halo indicates the approach of precipitation only in so far as it heralds the approach of the cyclone. To only the extent that the passage of the cyclone affects the weather at the station is the halo reliable. With knowledge of the condition of the barometer, whether rising or falling, and knowing which direction of the wind most often precedes precipitation, the layman may know what degree of faith to place in the halo and its harbingers.... The halo is a faithful detector of cyclonic pressure; the pressure and wind indicate the cyclone's approach and passage, and the consideration of these three elements will go far to establish the halo, not as a promise of rain or storm but as a warning that somewhere far to the west a cyclone is advancing. In this point alone the halo excels."

Monthly Weather Review (*U. S. Mo. Weather Rev.*, 46 (1918), Nos. 3, pp. 15-192, pls. 9, figs. 10; 4, pp. 163-206, pls. 10, figs. 8).—In addition to weather forecasts, river and flood observations, and seismological reports for March and April, 1918; lists of additions to the Weather Bureau Library and of recent books on meteorology and seismology; notes on the weather of the months; and sky and sky radiation measurements at Washington, D. C., during March and

April, 1918; condensed climatological summaries; and the usual climatological tables and charts, these numbers contain the following articles:

No. 3.—A Promising Chemical Photometer for Plant Physiological Work, by C. S. Ridgway (see p. 524); Further Study of Halos in Relation to Weather, by H. H. Martin (see p. 511); Remarkable Halo Observed at Nashville, Tenn., March 16, 1918 (illus.), by R. M. Williamson; Solar Halo Phenomena Observed March 16, 1918, at Banners Elk, N. C. (illus.), by T. L. Loomis; Solar Disturbances and Terrestrial Weather (illus.), by E. Huntington (cont.); and Breathing Well in California, by N. M. Cunningham.

No. 4.—Absorption and Radiation of the Solar Atmosphere, by S. H. Hays (reprinted abs.); Halo of April 14, 1918, at Columbus, Ohio (illus.), by H. H. Martin; Inferior Arc of 46°-Halo, April 25, 1918, by J. L. Vesper; Ring Halos of Vertical Major Axis, by J. B. Dale (reprinted); Real Velocities of Meteors, by C. P. Olivier (reprinted abs.); Visible Weather [Chinook Winds, by R. T. Pound (reprinted); Weather Bureau Observations in Connection with the Solar Total Eclipse of June 8, 1918, by H. H. Kimball and S. P. Fitzgerald; Solar Disturbances and Terrestrial Weather (illus.), by E. Huntington (continued); Changes in Oceanic and Atmospheric Temperatures and Their Relation to Changes in the Sun's Activity, by F. Nansen (reprinted abs.); Wind of January 26, 1918, at Pasadena, Cal. (illus.), by F. A. Carpenter; Evaporation from a Circular Water Surface, by Nesta Thomas and A. L. Ingerson (reprinted abs.) (E. S. R., 38, p. 115); Redetermination of Heat of Vaporization of Water, by J. H. Mathews (reprinted abs.); Suggestions as to the Conditions Precedent to the Occurrence of Summer Thunderstorms, a Special Reference to That of June 14, 1914; by J. Fairgrieve (reprinted abs.); and Earthquake Weather.

Meteorological observations, P. VAN DER ELST (*Jaarb. Dept. Landb., Nijerl. Handel Nederland, Indië, 1916*, pp. 359-361).—Ways in which the meteorological service of the Dutch East Indies may be made more serviceable to agriculture are briefly outlined, and the steps taken to carry some of the recommendations into effect are described. Ecological studies, especially those relating to rice, are to be intensified under the reorganization.

### SOILS—FERTILIZERS.

Soil conditions and plant growth, E. J. RUSSELL (*London: Longmans, Green & Co., 1917*, 3. ed., rev., pp. VII+243, figs. 14).—This is a further revision of work previously noted (E. S. R., 34, p. 321). Considerable alterations have been made in the text and a new chapter on the colloidal properties of soils has been added. The revision is thoroughly up-to-date and is based upon a discriminating selection of the more important contributions to the subject since the previous edition was issued. Some contributions omitted from the first editions are also included. Incidentally the author calls attention to the lack of a suitable name for the subject with which this treatise deals.

Surface geology of Michigan, F. LEVEBERT (*Mich. Geol. and Biol. Survey*, 25, *Geol. Ser.* 21 (1917), pp. 43-215, pls. 15, figs. 4).—This is a revised reprint of papers which have been previously noted (E. S. R., 21, p. 718; 28, p. 422).

The effect of cattle on the erosion of canyon bottoms, J. T. DUCE (*Scientific Series*, 47 (1918), No. 1219, pp. 450-452).—From a study of the steep-walled arroyos of southern Colorado the author concludes that their development has been contemporaneous with the development of ranching, and he believes that they are due to the wearing of trails and the destruction of vegetation by cattle.

Soil survey of Jasper County, Ga., D. D. LONG and M. E. CARR (*U. S. Dep. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916*, pp. 43, fig. 1, map 1).—This survey, made in cooperation with the Georgia State College of Agriculture, de-

the soils of an area of 241,280 acres situated in the central part of the State and lying within the Piedmont Plateau region. The topography is generally rolling, with some hilly and broken areas, together with inextensive "swamps" or "glades." Natural drainage is thoroughly established except in the flatwoods.

The soils of the county are mostly residual in origin, being derived from gneiss, metamorphic-igneous, and sedimentary rocks of varying composition. Small areas of alluvial soils occur along the streams. Sixteen soil types of 11 series are mapped, in addition to meadow (Congaree material). Davidson clay, Cecil clay loam, Davidson clay loam, and Cecil sandy clay loam predominate, occupying 23.2, 18.3, 17.6, and 15.9 per cent of the total area, respectively.

**Soil survey of Box Butte County, Nebr.,** F. A. HAYES and J. H. ADAM (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916, pp. 34, pl. 1, fig. 1, map D*).—This survey, made in cooperation with the Nebraska Soil Survey, deals with the soils of an area of 684,800 acres lying near the northwestern corner of the State. The topography of the region ranges from almost flat on the tablelands to rough and extremely dissected in the descents toward the stream beds. Erosion by both wind and water is said to have greatly influenced the topography. The elevation of the county ranges from 3,850 to 4,600 ft. above sea level. Natural drainage is generally well established.

The soils of the county are grouped in respect to origin as residual alluvial, dune, and miscellaneous. Twelve soil types of 7 series are mapped, exclusive of miscellaneous materials mapped as dune sand, meadow, and rough grassland. Rosebud very fine sandy loam, Rosebud silt loam, and Valentine very fine sand predominate, occupying 34.2, 20, and 12.3 per cent of the total area, respectively.

**Soil survey of Yates County, N. Y.,** E. T. MAXON (*U. S. Dept. Agr., Adv. Sheets Field Oper. Bur. Soils, 1916, pp. 36, fig. 1, map 1*).—This survey, made in cooperation with Cornell University, deals with the soils of an area of 20,500 acres lying in the central part of western New York. The surface is from undulating or gently rolling in the extreme eastern and northeastern parts of the county to hilly or semimountainous in the southern and southwestern parts. The elevation ranges from 440 ft. above sea level in the northeastern part of the area to 2,110 ft. in the southwestern part. The uplands have fair to good natural drainage, while the bottom lands are poorly drained. The soils of the county are derived chiefly from glacial debris composed of granite, shale, and limestone, while areas of alluvial, residual, or cumulose soils are also present. Twenty-one soil types representing 10 series are mapped. In addition to muck and rough stony land, Ontario loam, Volusia silt loam, and Lordstown stony silt loam, occupying 20.9, 17.7, and 12.1 per cent of the total area, respectively, predominate.

**On the origin of "terra rossa" (red soil) in Italy,** M. GORTANI (*Abs. in Bot. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr., 9 (1918), No. 23, 24; Chem. Abs., 12 (1918), No. 16, p. 1676*).—This article reviews the theories of the origin of the red soils of Italy, particularly that of Savi. The author's tentative conclusion is that "terra rossa" is the residue from the disintegration of limestones and dolomites, consisting essentially of hydrates of aluminum generally combined with hydrates of iron and other mineral substances. He, however, believes that more searching investigation of the subject is necessary before positive conclusions can be drawn.

**Soil acidity.—I. Its relation to the growth of plants,** E. THORP (*Soil Sci., 5 (1918), No. 3, pp. 169-195*).—This paper, a contribution from the Wisconsin Experiment Station, is the first of a series of articles on the subject of soil

acidity. It comprises a detailed consideration of its harmful effects upon plant growth as shown by the work of numerous investigators, together with a statement of the author's theory for the causes of these detrimental influences.

The causes, as suggested by the different investigators, have been classified as (1) indirect and general, due to the effect of soil acidity upon the general fertility of the soil, upon the prevalence of plant diseases, and upon the competitive powers of different species of plants; and (2) direct and specific, due to the effect of soil acidity upon the supply of available calcium to plants as direct plant-food material, upon the symbiotic nitrogen-fixing bacteria of the legumes, and upon the root tissues of plants. These points are discussed separately, but are deemed an inadequate explanation of the specific character of the phenomenon.

The thesis is advanced that the injurious effect of soil acidity upon plants is due primarily to its influences in preventing the plants from obtaining at a sufficiently rapid rate the calcium as the carbonate or bicarbonate which they need to neutralize and precipitate certain acids in the plants themselves, which are thought to be largely by-products following certain vital reactions in the growth of plants. This theory is based upon the assumption that each species of plant has a certain lime requirement, defined as "the amount of lime needed by the plant itself, especially as to the ease and rate at which lime can be secured from the soil by the plant for normal growth," and that this requirement must be satisfied.

Three main factors are said to determine the lime requirement of a plant, namely, the lime content of the plant, the rate of growth, and the feeding powers of the plant for lime. The first two factors operate in one direction, and the third operates in the opposite direction, the resultant of the three giving the lime requirement of the plant. A simple method of expressing these factors and obtaining the resultant is described.

A tabular statement compiled from various sources and showing the lime requirements of 62 species of plants, including a wide variety of field and garden crops and 4 kinds of trees, is presented, together with comparative figures representing the relative response of these plants to the liming of the soils and their ability to grow on acid soils. "The comparison reveals a close correspondence and hence substantiates the theory which has been proposed, that usually the main specific injury of soil acidity is that it prevents plants, especially those with high lime requirements and relatively weak feeding powers, from getting the lime from the soil at a sufficiently rapid rate to meet their needs. This is further substantiated by the parallel relation found between the amount of growth of alfalfa on acid soils and the amount of lime which could be extracted with carbonated water from these soils. These considerations are specially important in formulating a practical system of lime, especially as regards the amount to be used which, as is discussed in detail, is dependent on the lime requirement of the crop, the degree of acidity of the soil, and the fertility of the soil."

A list of references comprising 49 titles is appended.

**The action of neutral salts on humus and other experiments on soil acidity.** L. J. GILLESPIE and L. E. WISE (*Jour. Amer. Chem. Soc.*, 40 (1918), No. 5, pp. 796-813, fig. 1).—In the investigations by the Bureau of Plant Industry of the U. S. Department of Agriculture here reported, "the action of humus on suspensions of sodium, potassium, and barium chlorids of different strengths was studied by means of the hydrogen electrode.

"The measurements showed that on the addition of chlorids to humus suspensions or suspensions the potential of the gas chain was very considerably

and, showing that there was a large increase of hydrogen ion concentration. Similar effects of smaller magnitude were seen in the action of potassium acid on true solutions in the absence of humus or undissolved substance; these effects make it unsafe to draw conclusions as to the detailed mechanism of the process in the case of humus. At equivalent concentrations barium acid exerted the greatest effect on the potential of humus preparations. The action of the diffusion potentials and the uncertainty of their magnitude seem to make it unsafe to conclude from these experiments that barium acts more extensively with humus than potassium.

Some experiments with litmus paper served to call attention to the difficulties and limitations of the litmus-paper test as applied to soils and soil extracts. These experiments make it plain that there is no ground for a recent classification of soils which respond in the moist state to blue litmus paper into two types, 'truly acid' and otherwise, according to the behavior of the litmus paper toward the aqueous soil extract. Litmus paper can not be used, without suitable precautions, to arrange soils in the order of their intensities of acidity. No proof has yet been brought forth that soils can act on litmus paper solely by virtue of their adsorptive capacity. The behavior of litmus paper toward the moist soil and the soil extract can be explained in a simple way without reference to adsorption.

It has been pointed out that it is dangerous to make broad general statements as to the cause of soil acidity. Against the positive evidence, obtained by means of the hydrogen electrode and suitable indicators, in favor of the common occurrence of truly acid soils, there has been produced no valid negative evidence based on adsorption or on the behavior of soils toward neutral salts. Truly acid soils are not rare, but very common and widely distributed in the United States."

The value of blue litmus paper from different sources as a test for soil acidity. P. E. KARRAKER (*Jour. Amer. Soc. Agron.*, 10 (1918), No. 4, pp. 189-190).—This paper, a contribution from the Kentucky Experiment Station, gives a brief account of trials of samples of blue litmus paper from various sources in a comparison with a very sensitive Kallbaum paper by testing for acidity in a soil having a limestone requirement of 2,912 lbs., as determined by the lime-water method. The Kallbaum paper showed a distinct pink in 2 minutes, the maximum color being attained in about 5 minutes. The other samples varied from about 5 minutes to 2 hours, while some failed to show any color at all.

Tests made in thousandth-normal hydrochloric acid solution showed the same relative sensitiveness as that observed in the soil. Neutral litmus papers from different sources failed to give distinct color changes and are deemed unsuited for this work.

The Kallbaum paper placed in soils of limestone origin that produced vigorous effervescence with hydrochloric acid showed a slight pink after 30 minutes in a heavy subsoil, but remained blue in a lighter surface soil, indicating a tendency for sensitive paper to develop a pink color in soils of high colloidal content even in the absence of an acid condition.

"It is thought inadvisable to recommend the blue litmus paper test to farmers as a means of testing for soil acidity. In the hands of an operator who is familiar with the paper he is using and knows what color changes to expect under various conditions, the test is a good qualitative one for soil acidity, and in addition gives some information in a quantitative way, but for general use it can not be considered reliable and may give results which are utterly misleading."

Studies on the correlation between the production of carbon dioxide and the accumulation of ammonia by soil organisms. J. R. NEILL (*Soil Sci. Soc. Am.*, No. 3, pp. 225-241, figs. 6).—This paper, a contribution from the New Jersey Experiment Stations, reports the progress of investigations to ascertain the relationship between ammonia accumulation in the soil and biological activity, as measured by carbon dioxide production. Studies have been made of the organic decomposition by pure cultures and mixtures of pure cultures of bacteria, fungi and of soil infusions employing 1 per cent of cottonseed meal or alfalfa as a source of organic matter in Norfolk sandy loam soil. An apparatus is described and illustrated for the quantitative determination of carbon dioxide evolved biologically from the soil. Tabulated data are presented and figures are discussed, showing the carbon dioxide production and ammonia accumulation under the various treatments and the relative oxidizing and ammonifying powers of the different pure cultures and mixtures. The results obtained may be briefly summarized as follows:

Duplicate determinations indicated that carbon dioxide production was more uniform than ammonia accumulation for a 12-day period. A high carbon dioxide production by pure cultures of bacteria was accompanied generally by a high ammonia accumulation with 1 per cent of either cottonseed meal or alfalfa in Norfolk sandy loam. Pure cultures of fungi oxidized more of the carbon of alfalfa than the pure cultures of bacteria, but the latter caused the accumulation of much more ammonia. The more active species of fungi not only caused no accumulation of ammonia, but even used up some of the small amounts appearing in the checks. Soil infusions gave results similar to those from fungi cultures with respect to ammonia accumulation, but were more active in the production of carbon dioxide. A low accumulation of ammonia with alfalfa as a source of organic matter is held to indicate a high rather than a low activity. Since the behavior of soil infusions resembled that of fungi rather than that of bacteria, fungi are deemed to be the more active components of the native soil flora. The mixtures of pure cultures of bacteria showed no antagonism and in some cases a symbiotic relation seemed to exist. Mixtures of pure cultures of fungi or of fungi and bacteria have not been studied sufficiently to permit of any conclusions at this time.

A list of 14 titles comprising the literature cited is appended.

The effect of certain factors on the carbon dioxide content of soil air. J. A. BIZZELL and T. L. LYON (*Jour. Amer. Soc. Agron.*, 10 (1918), No. 3, pp. 37-42, figs. 9; *abs. in Chem. Abs.*, 12 (1918), No. 9, p. 967).—Observations on the effect upon the carbon dioxide content of soil air of a growing crop (oats), quicklime, and limestone are recorded. The investigations were conducted with the Dunkirk clay loam and Volusia silt loam soils in the large lysimeter tanks at Cornell University (E. S. R., 21, p. 117), the samples of air being collected from the drainage tubes. Carbon dioxide determinations were made weekly from June 21 to September 27, 1916. The results are fully discussed and plotted as curves.

The authors conclude that "on Dunkirk clay loam cropping with oats produced striking fluctuations in the carbon dioxide content of the soil air. The greatest apparent production was at the blooming period. Subsequent to the blooming period there was a marked decrease in the amount of carbon dioxide and this decrease was apparently due to the depressing effect of the crop on production by bacterial action. On Volusia silt loam the crop apparently had little effect on the carbon dioxide content.

"On Volusia silt loam addition of quicklime increased the amount of carbon dioxide in the soil air. This effect was noticed both on the cropped and on the

ropped tanks. On Dunkirk clay loam quicklime apparently produced no effect.

Treatment of Volusia silt loam with burnt lime was accompanied by larger application of carbon dioxide than was the treatment with a chemically equivalent quantity of ground limestone."

The gases of swamp rice soils, W. H. HARRISON and P. A. SUBRAMANIAM *Amer. Jour. Soil. Sci.*, 1 (1917), No. 6, pp. 519, 520).—A brief review of the four series of experiments on this subject previously noted from another source (*U. S. R.*, 37, p. 424.)

Lysimeter experiments. Records for tanks 1 to 12 during the years 1910 to 1914, inclusive, T. L. LYON and J. A. BIZZELL (*New York Council Sta. Mem.*, 1 (1918), pp. 115, pls. 4, figs. 9).—The authors present a detailed report on investigations "designed to ascertain the extent to which, and some of the conditions under which, calcium is removed in drainage water and in crops from two rather prevalent soil types, and at the same time to study certain of the changes that accompany the loss of calcium. With this in view, the removal of magnesium, potassium, sodium, nitrogen, sulphur, phosphorus, and a few less important elements has been determined, in order to discover the relations between these substances and to ascertain whether substitutions of one for another in the soil with release in the drainage water of the replaced constituent."

The 12 lysimeters used in the experiments consisted of concrete tanks 12 ft. by 12 ft. over 4 ft. square and of about the same depth. The bottoms were funnel-shaped, with drainpipes leading to a tunnel where the drainage water was collected. The tanks were lined with water-proofing asphaltum. Each tank was filled with 34 tons of Dunkirk clay loam soil, taken from the field in layers 12 in. deep and placed in the tank in the order in which the layers occurred in the field. Some of the tanks were cropped, while others were left bare. Certain tanks received an application of burnt lime at the beginning of the experiment and some received annual applications of sulphate of potash. All tanks received the natural rainfall but no other water. The drainage water that percolated through the soil was collected, measured, and analyzed. For purposes of comparison plats were laid out in the field from which the soil was taken for the tanks and received the same treatments as the tank soil.

The average annual rainfall for the five years was 31.14 in., of which 24.4 in. was related through the unplanted soil and 16.96 in. percolated through the cropped soil. About one-half of the rainfall passed into the air from the surface of the soil and through the plants growing on it. In general the largest flow of drainage water was during March and April. Applications of lime had no noticeable effect on the proportion of rainfall that percolated through the soil.

The average evapo-transpiration ratio for the cropped soils was 1:580, the highest being maize, oats, wheat, timothy, clover, and mixed grasses. The average minimum transpiration ratio for the same crops was 1:250, being least for maize and greatest for the grasses, while oats was intermediate. With crops of average yield amounting in the case of maize to over 100 bu. of grain, there was over a deficiency of moisture in the soil, illustrating the great water-holding capacity of a well-drained soil.

The quantity of nitrogen in the drainage water from the unplanted soil was 17 times as much as in the water from the cropped soil. Lime had no effect on the amount of nitrogen contained in the drainage water nor on the quantity of the nonleguminous crops. More nitrogen was found in the drainage water of the unplanted tanks than in both the drainage water and the crops of the cropped tanks. Some plants seemed to use a greater quantity of soil nitrogen than did others, without causing the nitrates in the drainage water to become



less. The data appear to support the idea that certain kinds of plants have a depressing influence on the production of nitrates in soil.

The quantity of calcium in the drainage water of the unplanted tanks was greater than that in the crops and the drainage water combined on the planted tanks, making possible a conservation of 181 lbs. of calcium per acre by cropping the soil instead of leaving it bare. The larger removal of calcium in the drainage water from unplanted soil than from cropped soil was due largely to the much greater quantity of nitric acid leached from the unplanted soil. Carbonic acid also was regarded as a factor in the greater removal of calcium from the bare soil. Both the total quantity and the concentration of bicarbonates was greater in the drainage water from the bare soil. The large amount of carbonic acid excreted by the roots of plants was deemed to have no effect in increasing the solvent action of the soil water on calcium, probably because the soil water was already saturated with carbon dioxide. Lime applied at the rate of 3,000 lbs. per acre did not increase the quantity of calcium in the drainage water or in the ash of the crops produced, but the percentage of calcium was, in the main, somewhat higher in the ash raised on the limed soil. Annual applications of potassium sulphate at the rate of 200 lbs. per acre materially increased the quantity of calcium in the drainage water. To maintain the soil supply of calcium up to its present amount would require an annual application of 514 lbs. per acre for uncropped soil or 277 lbs. per acre for cropped soil.

Magnesium was found in much smaller quantity in the drainage water than was calcium, and its removal was also decreased by cropping. The addition of lime and of sulphate of potash resulted in a liberation of magnesium as indicated by its greater removal in the drainage water. The calcium-magnesium ratio was much wider in the drainage water than in the soil, owing to the greater solubility of calcium over magnesium, while the application of lime by rendering the magnesium more soluble, narrowed the calcium-magnesium ratio in the drainage water.

Potassium was removed in smaller quantity by the drainage water than by the crops, differing in this respect from calcium, magnesium, and sodium. The application of lime did not result in an increase in the quantity of potassium contained in the drainage water nor in the amount removed by the crops. Applications of sulphate of potash did not cause an increase in the removal of potassium in the drainage water.

Sodium was taken up in small amounts by crops, but was removed in larger quantity in the drainage water than was either magnesium or potassium. Application of lime decreased the removal of sodium both by crops and in the drainage water.

The removal of sulphur in the drainage water was from three to six times as great as in the crops, about as much being carried off by the drainage water from the unplanted soil as was removed by both drainage water and crops from the planted soil. The addition of lime was followed by an increase in the quantity of sulphur in the drainage water. Of the sulphur added to the soil in the form of sulphate of potash, more than one-half was removed in the drainage.

Only a trace of phosphorus was observed in the drainage water from any of these tanks. There appeared to be no relation between the lime application and the quantities of phosphorus removed in the crops.

A brief account of the methods of analysis employed in the investigations and considerable tabulated data are appended, together with a bibliography of 20 titles.

tests of an "all crops" soil inoculum, L. EMERSON (*Harvard St. Bul.* 214, 1911, pp. 127-149, figs. 5).—Laboratory and field tests of a so-called "all crops" soil inoculum are described. The laboratory tests embraced a comparison of the inoculum with an ordinary garden soil in bacterial, mold, protozoan, organic content; in cellulose decomposing power; and in ammonifying, nitrifying, and nitrogen-fixing powers. In addition, tests of the nitrogen-fixing powers of the inoculum were also made under varying conditions in the greenhouse and in the field. The results obtained are presented in tabular form and fully discussed, and may be summarized as follows:

Chemical activities of the inoculum in the laboratory tests were neither superior nor inferior to those of an ordinary garden soil, except that its cellulose-decomposing power was found to be greater. The addition of the inoculum to a soil did not affect either the bacterial content or the bacterial activities of the soil after 60 days. When added to fallow soil the inoculum showed a reduction in the organic content of the soil after 60 days. Soy beans and corn grown on the inoculated soil slightly stimulated the nitrogen-fixing powers of the inoculum, while corn and wheat seemed to retard it and red clover appeared to have no effect. Lime, calcium carbonate, and lime and manure together added to an inoculated soil resulted in a decrease in the nitrogen content, while manure alone slightly retarded the nitrogen-fixing powers. The action of the inoculum was found to be slightly beneficial to wheat and corn in the field, more so for red clover, and detrimental to soy beans.

On making and storing farmyard manure, E. J. RUSSELL and E. H. RICHES (*Sci. Jour. Roy. Agr. Soc. England*, 77 (1916), pp. 1-38, figs. 8).—The history of the handling and use of manure is briefly reviewed, the relation of manure to soil is explained, and the following topics are discussed on the basis of experimental work at Rothamsted and elsewhere: Composition of manure as made on the farm; losses during storage including effect of compacting, shelter, organic content, moving the heap, and summer storage; decomposition of manure under carefully controlled laboratory conditions; manure heaps in winter; hauling out the manure; and storage of dairy manure.

The authors' practical purpose was to find out whether the investigations that had been made suggest any better way of dealing with manure than has been used hitherto. Their general conclusion is that present methods of storing manure are essentially wasteful, and that while certain precautions may be taken in winter, spring, and early summer to reduce the loss, they are not really successful and are apt to break down in the summer. Exposure of manure to weather always leads to loss. The smallest loss occurs when the manure is made under cover and applied to the land directly it is hauled out. This, however, is not always practicable.

When it is necessary to keep the manure in a heap this should be compacted and sheltered. "Compacting and sheltering only delay the decomposition processes and do not entirely stop them. They are effective in winter, spring, and early summer, but they are apt to break down in late summer when the outside temperature is high. Summer storage of manure is very wasteful and may be a serious source of loss on farms where the acreage under roots or potatoes is insufficient to absorb all the manure produced. If, however, it were possible to store the manure entirely out of contact with air a rise of temperature would be actually helpful and not harmful. Under these conditions there is not only no loss, but a positive gain in value of the manure. We hope to be able to make the necessary large scale trials in the near future."

The authors are of the opinion that on dairy farms provision should be made to collect the urine in the cow houses, and they consider the Belgian tank

(E. S. R., 28, p. 86) well suited to this purpose. In this case the solid manure and litter should be kept in a sheltered and compacted heap with a trench to collect the drainings.

**Nitrification of manure in the field.** C. BARTHEL (*Meddel. Centralanst. f. sökersk. Jordbruksområdet*, No. 150 (1917), pp. 13; *K. Landtbr. Akad. Handl. Tidskr.*, 56 (1917), No. 5, pp. 402-412; *abs. in Chem. Abs.*, 12 (1918), No. 7, p. 736).—Investigations are reported which indicate that more or less ammonia-nitrogen is produced in the course of five months in manure spread in the field, but that this does not account for all of the ammonia-nitrogen fixed in the manure during this period. The nitrate-nitrogen formed from the ammonia-nitrogen was found to be practically constant and independent of the absolute amount of manure added to the soil. Nitric-nitrogen developed fully as well in acid soils as in neutral soils. Previous observations of the author that ammonia-nitrogen changes into nitrate-nitrogen less readily than organic-nitrogen were confirmed, this being probably explained by the increased hydrogen-ion concentration resulting from the transformation of ammonia-sulphate.

**Why not fertilize in the hill?** C. E. THORNE (*Mo. Bul. Ohio Sta.*, 3 (1918), No. 6, pp. 182, 183).—The advantage of broadcasting fertilizers and manure over hill fertilizing, with particular reference to the effect upon the succeeding crops as demonstrated by results obtained with crops grown in rotation at Wooster and at Strongsville, is briefly discussed.

**Absorption and nitrification of ammonium compounds in the presence of zeolites in soil.** Estimation of ammonia in soil and on zeolitic substances. F. MÜNSTER (*Landw. Vers. Stat.*, 90 (1917), pp. 147-189; *abs. in Jour. Agr. Soc. [London]*, 112 (1917), No. 662, 1, pp. 722, 723).—Experiments are reported which show that sandy soils are capable of absorbing ammonia from ammonium sulphate to an appreciable extent and that over 10 per cent of the ammonia absorbed can not be recovered by distillation with magnesia.

The addition of zeolites increased the amount of ammonia absorbed by a further 20 to 25 per cent of the total added. The ammonia held by the sandy soil was found to be more easily nitrified than that absorbed by zeolites. The ammonia retained by zeolites, when boiled with magnesia, was completely recovered by a further addition of potassium chlorid before distillation. The ammonia retained by soil was found to be more resistant to this treatment. Pure sand did not absorb ammonia and the addition of silicic acid and aluminum hydroxide was without effect.

"The hydroxids and carbonates of calcium, barium, strontium, and sodium with or without the addition of neutral salts, either fail to expel all the absorbed ammonia or else lead to decomposition of the soil organic matter. The general conclusion is drawn that adsorption and absorption occur simultaneously in the soil without any definite relation existing between the two."

**Trials on grassland with open-hearth basic slag and rock phosphates.** G. S. ROBERTSON (*Jour. Bd. Agr. [London]*, 24 (1918), No. 10, pp. 1077-1086).—The author presents a preliminary report on tests of the relative value of low and high citric-soluble phosphates on meadow hay grown on three types of soil in Essex. The experiments were planned primarily to determine the value of open-hearth basic slag, or fluorspar slag, recommended for use by Gilchrist and Louis (E. S. R., 37, p. 723), and they include a comparison of high-grade basic slag with a solubility of the phosphate in 2 per cent citric acid, of 92 per cent; Gafsa rock phosphate with a solubility of 38.3 per cent, and two low-grade slags with solubilities of 93.4 and 82.2 per cent, respectively. The fluorspar slag employed had a solubility of 45 per cent. The results obtained in 1916 and 1917

are tabulated, showing the yields of hay on each soil type and for each treatment, and are briefly discussed.

The average increases for all the tests over the untreated checks amounted 105 per cent for the high-grade basic slag, 28.2 per cent for Gafsa rock phosphate, 42.6 per cent for fluor spar slag, and 31.3 and 37.4 per cent, respectively, for the two low-grade high-soluble slags. The use of fluor spar slag is recommended for improving poor pasture and meadow land, and the normal soluble slags are recommended for cereal crops.

**Reverted phosphate**, C. C. JAMES (*Jour. Indust. and Engin. Chem.*, 10 (1918), vol. 1, pp. 33-35, figs. 3).—A study in continuation of previous work (E. S. R., p. 122) of the rate and extent of reversion of acid phosphate, when mixed with varying amounts and combinations of lime and calcium carbonate in laboratory experiments and factory tests, showed that complete reversion was secured in a comparatively short time, but more quickly with lime than with calcium carbonate.

The author states that he has found "in numerous cases that the reverted phosphate is just as valuable or even more valuable than the water-soluble when applied to come upon upland soils. These soils are, as a rule, highly ferruginous. On soils which have not been cropped for several years the reverted phosphate gives excellent results."

**The phosphate production and resources of the world**, P. G. MONTAN (*Jour. Geol. Soc. [New Zealand]*, 16 (1918), No. 2, pp. 76-82).—This is a summarized discussion of available information obtained from various sources relative to the world's production and supply of phosphates.

**Awards for the location of workable phosphatic deposits in Germany** (*Abh. Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr.*, 9 (1918), No. 1, p. 42).—In order to increase the output of phosphates, of which there has been a shortage since the beginning of the war, "awards to the amount of 10,000 marks (\$23,800) have been offered for the location of new phosphate deposits and for their study, either within the German Empire or in the occupied territories in the East."

**The collection of kelp in the United States for potash production** (*Abh. Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr.*, 9 (1918), No. 1, p. 16).—Special attention is given in this article to the methods and machinery used in collecting the kelp.

**Influence of gypsum upon the solubility of potash in soils**, P. R. McMILLER (*Ann. Agr. Research [U. S.]*, 14 (1918), No. 1, pp. 61-66).—Experiments at the Marston Experiment Station are reported which showed that when various soils mixed with 1 per cent of gypsum were kept under moisture conditions similar to those prevailing in the field (approximate moisture equivalent) for 12 months, there were marked increases in the content of water-soluble potash. It is suggested that "the results in previously reported experiments by various investigators in which the action of gypsum has not been found to cause such an increase may be due to the conditions of contact between the soil and gypsum that they have employed being unlike those that obtain in the field."

**Analyses of county limestone deposits**, J. W. AMES (*Mo. Bul. Ohio Sta.*, 5 (1918), No. 7, pp. 222, 223).—This reports the results of analyses of 254 samples of limestone from different sections of Ohio, showing the percentage of calcium carbonate equivalent to the neutralizing power of the calcium and magnesium content of the sample. The results "indicate that there are numerous undeveloped supplies which could be utilized locally to good advantage pro-

viding the quantity is sufficient to warrant installing a pulverizing apparatus for the community."

**An agronomic study of several fertilizing or anticyptogamic compounds used in agriculture.** B. DE WILKOSZEWSKI (*Arch. Sci. Phys. et Nat.*, [Geneva], ser., 44 (1917), pp. 165-189; *abs. in Jour. Chem. Soc. [London]*, 112 (1917), 662, I, p. 723).—Examinations of percolates through columns of natural and artificial soils of different types treated with solutions of various salts showed "iron in solution as ferric sulphate is more rapidly absorbed by the soil than in the ferrous state, any iron retained from ferrous sulphate being found in the ferric state in the soil. The salts are converted into their hydroxids, the ferric hydroxid being subsequently oxidized and held in the soil in the ferric state. This hydrolysis is markedly favored by the presence of the soil particles. Similar results were obtained with manganese sulphate and copper sulphate. In all cases undergoing hydrolysis and, where possible, oxidation, the metal being retained in the soil and the acid ion passing on into the drainage water."

"In the case of calcium cyanamid this material is converted into calcium ammonium carbonate, and subsequently calcium nitrite and nitrate, the conversion being much more rapid where a solution is used than where the solid is mixed into the soil. The author considers that microorganisms are not essential for these changes, as they occurred in a sterilized soil. The oxidation of nitrite and nitrate goes on most rapidly in soils of a porous nature, such as infusorial earths."

**Sulphuric acid and fertilizer industries** (*Chem. Trade Jour.*, 62 (1918), 1607, pp. 203-207; *rev. in Jour. Bd. Agr. [London]*, 25 (1918), No. 2, pp. 198).—This is a report of a committee appointed by the Minister of Munitions of Great Britain "to consider and report on the position of the sulphuric acid and fertilizer trades as affected by the new acid plants which have been erected during the war by the Minister of Munitions for the Government."

The committee estimates that there has been a 60 per cent increase in the production of sulphuric acid since the beginning of the war, one-half of this increase being derived from works owned or controlled by the Government and operated mainly for supplying munitions works. Of the prewar production about 30 per cent was consumed in the manufacture of superphosphates, an equal amount in the manufacture of sulphate of ammonia. The prewar production capacity was considerably larger than the actual output.

At the outbreak of the war the output of ammonia amounted to 400,000 tons per annum expressed as sulphate. "About 15 per cent of this production was put on the market in the form of sulphate, but was converted into other ammonium products. The home consumption of sulphate of ammonia for agricultural purposes was only 60,000 tons per annum, and the remainder was mainly exported. During the war "the production of sulphate of ammonia has, however, still undergone a temporary decline, owing to the diversion of large quantities of ammonia to the production of nitrate of ammonia. In view of the requirements of sulphuric acid for explosives manufacture, plants have been erected on a considerable scale for the conversion of crude ammonia into concentrated ammoniacal liquor. A substantial proportion of the requirements of ammonia for munition purposes have thus been purchased in a form which requires no sulphuric acid for its manufacture. The total production of sulphate has thus been temporarily reduced from 350,000 tons to a little over 250,000 tons. At the same time there has been a large increase in the home consumption for agricultural purposes, owing to the substitution of this fertilizer for nitrate of soda, the entire supply of which has been required for explosives manufacture. The export trade has nearly disappeared."

for some years before the war the manufacture of superphosphate . . . was in a very unsettled condition owing to the rapidly increasing importation of foreign manufacture and the gradual decline in the export trade. The output of superphosphates had reached a maximum of 160,000 tons in 1911, and afterwards declined to 63,000 tons in 1913. . . . As in the case of sulphuric acid, the available plant was capable, if continuously worked, of producing considerably more than the actual requirements of superphosphate.

The production of superphosphate has been very materially reduced since the war owing to the lack of sulphuric acid. The production of superphosphate in 1916 fell to about 500,000 tons, as compared with about 800,000 tons in 1914. During the last few months, however, the paramount necessity of increasing the home-grown food supply has been realized, and steps have been taken to secure a large and immediate production of superphosphate."

The committee is of the opinion that "by far the most important prospect for utilizing the increased quantities of acid is in the manufacture of artificial fertilizers," and that "the large surplus of sulphuric acid plants which will be available at the end of the war provides an opportunity of an altogether exceptional nature for the development of a vigorous agricultural policy leading to the efficient cultivation of the soil." It therefore recommends that the Government take every possible step through the exercise of its compulsory powers and by the use of educational methods of various kinds to encourage the use of fertilizers.

**Use of Philippine composts.** F. B. SARAO (*Philippine Agr. and Forester*, 6 (1916), No. 5-6, pp. 128-134).—This reports the results of observations on the rate of decomposition and shrinkage, the percentage of moisture and total nitrogen, and the increase in total nitrogen in different materials composted in open, shaded and unshaded and shaded and open piles. The materials studied included corn, cane, and sorghum trash; mixed herbaceous plants, including ground pea vines and amaranthus and other weeds; rice straw; cogon (*Imperata*); bamboo leaves; and banana stems and leaves.

Bamboo trash compost showed the highest percentage of nitrogen, 0.9 per cent, that from corn trash and mixed herbaceous plants being next in order with 0.7 per cent each. Banana stems and leaves showed the highest shrinkage, together with rice straw, composted most rapidly. Cogon showed the least shrinkage. No relation between the rate of decomposition and the percentage of nitrogen content in the compost was observed.

**Water hyacinth (*Eichornia crassipes*): Its value as a fertilizer.** R. S. FINCH and K. McLEAN (*Agr. Research Inst. Pusa Bul.* 71 (1917), pp. 16, pl. 1).—Analyses of the water hyacinth, said to occur as a noxious weed throughout the Eastern District of Bengal, are noted, and show the rotted or dried plant and its ash to be quite rich in potash. The rotted material, containing about 65 per cent moisture, showed approximately 0.57 per cent nitrogen, 0.28 per cent phosphorus, and 2.57 per cent potash, while the dried plant contained from 0.22 per cent nitrogen and about 8 per cent potash. The ash showed from 0.25 per cent potash, mostly as chlorid, and in addition relatively large amounts of sodium, lime, and phosphoric acid.

Further results were obtained from the use of both the rotted material and its ash as a potash fertilizer for jute in rather extensive field tests on laterite and on the old alluvium in Bengal.

**Water hyacinth as a source of potash.** F. W. F. DAY (*Agr. Bul. Fed. Malaya States*, 6 (1918), No. 7-8, pp. 309-314).—In connection with work suggested by the article noted above, analyses were made of water hyacinths collected from different parts of the Federated Malay States, and similar results were obtained.

**Whale fertilizer** (*Agr. Gaz. Canada*, 5 (1918), No. 4, p. 376).—It is reported that the Department of Agriculture of Canada "has purchased for distribution in the Province [of British Columbia] 50 tons of whale fertilizer. It is manufactured from whale meat and blood, the oil having been extracted. Analysis shows it to contain 12.4 per cent of nitrogen. It is being sold to farmers and farmers' organizations at approximately \$72 per ton, which includes transportation."

**Sources of fertilizing materials for Illinois farms**, C. G. HOPKINS and F. BAUER (*Illinois Sta. Circ.* 223 (1918), pp. 8, fig. 1).—Information is presented relative to sources of supply readily available to Illinois farmers of agricultural limestone, limestone crushing machinery, limestone and phosphate sprays, raw rock phosphate, bone meal, and potassium salts.

### AGRICULTURAL BOTANY.

**A promising chemical photometer for plant physiological research**, R. L. RUDGWAY (*U. S. Mo. Weather Rev.*, 46 (1918), No. 3, pp. 117-119).—Attention is called to a chemical photometer which, so far as tested, seems adapted for use in investigations of the light relations of plants. The principle on which the photometer is based is the reaction of light to a mixture of oxalic acid and uranium salts. Comparisons were made with a pyrheliometer, the light exposure of the solutions ranging from 8 to 24 hours, and very close agreements were shown. Other experiments conducted for the purpose of measuring the intensity of sunlight on clear days produced curves very similar to those obtained with the pyrheliometer.

The author claims that some of the probable advantages of the method are the ease and low cost with which it may be operated, the avoidance of complicated, costly, and frequently unreliable mechanisms, and the reduction of error due to the personal factor in observation, so prominent in the photographic paper method.

**A comparison of salt requirements for young and for mature buckwheat plants in water cultures and sand cultures**, J. W. SHIVE and W. H. MANN (*Amer. Jour. Bot.*, 5 (1918), No. 4, pp. 186-191).—In a preliminary presentation of the main results of an attempt to determine the best proportions of the nutrient solution previously employed by Shive (*E. S. R.*, 34, p. 333) and used according to methods described by him (*E. S. R.*, 36, p. 328), the authors state that the salt proportions giving the best physiological balance for buckwheat during the early and the late period of growth and maturation are considered to differ markedly and in the same manner with water cultures as with sand cultures. In three of the four series a definite correlation appeared between the growths of tops and that of roots. The 3-salt mixture had an osmotic concentration of 1.75 atmospheres and with proper salt proportions produced markedly higher yields than did either Knop's or Tottengham's salt with the same concentration for the two growth periods here used.

**The origin of inulin in plants**, H. COLIN (*Compt. Rend. Acad. Sci. (Paris)*, 166 (1918), No. 5, pp. 224-227).—The tabulated results of studies on Jerusalem artichoke and chicory show that those portions of the plants which contained starch contained no inulin. In other portions the ratio of inulin to the total sugars present increased from the root tips to the crown and was found to be increasingly, though slightly, greater in the smaller tubercles, stolons, and larger tubercles.

**Respiration and catalase activity in sweet corn**, C. O. APPLEMAN (*Amer. Jour. Bot.*, 5 (1918), No. 4, pp. 207-209, fig. 1).—Having shown (*E. S. R.*, 36, p. 177) a relation between the respiratory activity of potato tubers and catalase activity,

of expressed juice, the author here records experimentation showing a relation between respiration and catalase in sweet corn in the milk stage after it separated from the stalk. The decline in catalase activity after storage for 4 days is almost directly proportional to that in the respiratory activity of the same storage for a like period. It is stated that the data from both plant and animal tissues available at present seem to justify the general induction, catalase action is invariably correlated with the oxidative processes in respiration.

**The resistance of plants to cold.** I. E. PANTANELLI (*Atti R. Acad. Lincei, Cl. Sci. Fis., Mat. e Nat., 5. ser., 27 (1918), I. No. 3, pp. 136-139*). Tests were carried out with wheat, beet, and sunflower kept from January to April in a situation where they could be cooled below the freezing point and with corn and maize kept from April to July in a situation where they could be cooled to a temperature of 38° C. (100.4° F.) by day, dropping at night to 32° C. Lime was supplied in constant concentration to all cultures. To some were added, singly or in combination (amounting in some cases to a complete fertilizer), various salts of sodium, potassium, ammonium, and magnesium. The effects of the various substances are detailed.

In case of wheat no relation was discovered between resistance to cold and sugar concentration, as measured by cryoscopic methods. Before refrigeration sugars were not more abundant in the more resistant plants, but during exposure to low temperatures the sugars decreased more noticeably in those which showed little resistance to cold.

Beets, especially the young plants, suffered more from low temperatures than did wheat. As in wheat, the nitrates and, in general, materials rich in nitrogen lowered resistance to cold. In the beet, also, no proportionality was between resistance and concentration. During refrigeration sugar disappeared from all these cultures. Starch practically disappeared from all the beets which suffered from cold, but a certain quantity remained in those which stood cold.

**The plant succession in the thorn veld.** J. W. BEWS (*Isis, African Jour. Sci., 1917, No. 4, pp. 153-172, pls. 4, figs. 2*).—The author reports the results of his study on the thorn veld in the vicinity of Pietermaritzburg.

This type begins with the establishment in ravines and near stream banks of trees, shrubs, and other forms, owing chiefly to the activities of birds and quadrupeds named. The Acacias, especially *A. horrida* and *A. arabica* Krauss., are the principal pioneer species, being able to dispense largely with protection. Many other species follow, growing up from the soft seed beds provided by earthworms, termites, and ants, and utilizing the shade furnished by the acacias. The thorn trees usually remain dominant, though they are sometimes killed out by subsequent species. A long list of species is given as belonging to the thorn veld, with symbols denoting the relative frequency of their occurrence. Three formations, or important subformations, are distinguished as basal, rocky place, and stream-bank types.

**The direct influence of the sap elaborated by wild plants upon domesticated ones, and the influence of acid solutions directly absorbed.** C. CAMPBELL (*Atti R. Acad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 27 (1918), I. No. 3, pp. 47-61*).—The author has undertaken to study the effect of the sap of wild plants upon domesticated stocks and the effect of the direct absorption of various acid solutions by aerial portions of plants. Details are given of work as carried on during 1915 to 1917, inclusive. The effects obtained and discussed, which are considered to justify the continuation of this work, are resistance to disease and increase of leaf development and coloration.



The nutrition of green plants by means of organic substances, I, C. RAVENNA (*Gaz. Chim. Ital.*, 47 (1917), II, No. 3-4, pp. 131-139, figs. 3, 4).—Plants grown under illumination but without oxygen in glucose solution showed presence of amid in the leaves. The region of maximum amid formation, that of maximum chlorophyll activity in the solar spectrum were coincident. Amid was not found in plants cultivated in an atmosphere lacking carbon dioxide and oxygen.

The influence of some organic substances on plants, II, G. CIAMBERLINI and C. RAVENNA (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat. S. M.*, (1918), I, No. 1, pp. 38-42).—This is a continuation of work previously noted (E. S. R., 37, p. 632). The effects are detailed, with hypotheses and discussion of a number of organic compounds on the development of different plants.

The behavior of some organic substances in plants, VIII, G. CIAMBERLINI and C. RAVENNA (*Gaz. Chim. Ital.*, 47 (1917), II, No. 2, pp. 99-107).—Certain features and findings of work previously noted (E. S. R., 37, p. 632) have led to the initiation of a series of studies regarding which this is considered as preliminary. The study has been extended from adult plants to germinating seeds of maize, wheat, bean, lupine, and vetch, and the substances dealt with are saligenin, hydroquinone, pyrocatechin, benzyl alcohol, gallic acid, and tannin. The results are detailed. It is thought probable that substances regarded as accessory may perform real functions, even though these may remain for the present unknown.

The behavior of some organic substances in plants, IX, G. CIAMBERLINI and C. RAVENNA (*Gaz. Chim. Ital.*, 47 (1917), II, No. 3-4, pp. 109-119, pls. 2).—Dividing the organic substances occurring in plants into those which are thought to be indispensable and those whose functions or effects are partly or wholly unknown, the authors deal in some detail in the first part of this communication with the influence on maize and beans of some organic substances as regards the germination and development of the plant. In the second part they take up the possible alterations which some compounds found to be present undergo in the plant, experimental results and observations being detailed in this connection.

The influence of mineral materials on the germination of peas, I, MAQUENNE and E. DEMOUSSY (*Compt. Rend. Acad. Sci. [Paris]*, 165 (1917), No. 2, pp. 51).—Following up experimentation with peas as previously noted (E. S. R., 38, p. 329), the author found calcium to be apparently the only substance the presence of which was sufficient to assure normal germination. This was noted even in case of extremely weak solutions. Certain metals did seem to favor the growth of the roots. The unfavorable effects of other substances are discussed.

The influence of salts of various metals on germination in the presence of calcium, L. MAQUENNE and E. DEMOUSSY (*Compt. Rend. Acad. Sci. [Paris]*, 166 (1918), No. 3, pp. 89-92).—A continuation of the work reported above seems to have shown it to be true in general that various metals function during the course of germination as antagonistic to calcium.

Abnormalities of the ear in corn produced by treatment of the seed with copper, A. JUNGELSON (*Rev. Gén. Bot.*, 29 (1917), Nos. 344, pp. 244-248; 347, 261-285, pls. 3, fig. 1).—Tests were made on the development of corn from seeds kept before sprouting from 1 to 24 hours in 1 to 2 per cent copper solution after having been husked, deprived of endosperm, or pierced to the end of the embryo which was not mechanically injured. The author states that germinability was impaired, and the plantlets showed abnormal coloration as well as retardation of growth and flowering. The plant, after having been poisoned with copper, showed a tendency to vary which was both quantitatively and qualitatively.

passed, but was not uniform in its expression. The new characters did not appear to be stable or hereditary, but the tendency to vary appeared to be permitted.

**The effect of tobacco smoke and of methyl iodid vapor on the growth of certain microorganisms.** C. A. LUDWIG (*Amer. Jour. Bot.*, 5 (1918), No. 4, pp. 427-431).—The author records the effects of tobacco smoke and of methyl iodid vapor on a number of bacteria and fungi. He obtained with methyl iodid vapor, in general, an initial great retardation of development followed by very vigorous growth in cases where the strength was not sufficient to sterilize the culture. Tobacco smoke proved more or less toxic to the organisms, both bacteria and fungi, which were used, though not so much so as to some pangenograms which he tested.

**Cell measurement as an aid in the analysis of quantitative variation.** W. J. GIBBERSON, JR., and H. H. BARTLETT (*Amer. Jour. Bot.*, 5 (1918), No. 4, pp. 436, 438, 24).—In connection with genetic studies on *Phaseolus*, the authors have carried out studies of fluctuating variation due to the effect of light, said to be one of the most disturbing factors concerned in size inheritance.

It is stated that *P. multiflorus* grown in darkness may develop internode length as great as 3.6 times the normal length attained in light. This increase in length is said to be due to an increase in the number of divisions in the primary meristem (34 per cent) and in the length of the cell or group of cells issued from each primary division (66 per cent). Secondary cells formed by division of a primary cell during its extension are distinguished by the position of the cross walls. There appears to be a specific mean length, independent of light or darkness, for the division of the primary epidermal cells. It is necessary in appraising the relative importance of the cell number and cell length factors to discriminate carefully between primary and secondary cells.

**Mutations of *Oenothera suaveolens*.** H. DE VRIES (*Genetics*, 3 (1918), No. 1, pp. 1-25, figs. 4).—The author has studied the mutability of *O. suaveolens* in order to broaden the experimental field and meet the criticism of writers claiming that the phenomena reported as observed in experiments previously reported are essentially different from the origination of species and varieties in nature.

It is said that *O. suaveolens* has produced, under controlled conditions, since 1912 half a dozen different mutants, some of which are the same as those observed in allied species. Three such forms are named *lutea*, *sulfurea*, and *rosea*, and *recur*, respectively, in *O. lamarkiana*, *O. biennis*, and *O. lundiflora*. Among the special mutations, one, *O. suaveolens apetalata*, is of polyploid nature, having flowers without petals. Two narrow-leaved types occurred, *O. fastigiata* having erect branches, and *O. javalatrix* having almost linear leaves. The results are detailed of studies on these various forms and their crosses.

**First results from planting wild fig.** B. LONGO (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5, ser., 27 (1918), I, No. 7, pp. 55-57).—The author reports that planting the wild form of the fig (*Ficus carica*) gave as a result the same plants as many plants of the cultivated as of the wild variety.

**Studies on polyembryony.** B. LONGO (*Ann. Bot. [Rome]*, 14 (1917), No. 3, pp. 35-62, fig. 1).—The author notes with discussion cases of polyembryony in *Xanthoxylum bungei* and *X. alatum*, also related phenomena in these and other plants.

**Studies on the floral parts and genesis of the medlar.** IRMA PIERPAOLI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5, ser., 27 (1918), I, No. 3, pp. 141-145).—This is a study of several varieties of medlar (*Mespilus germanica*)

as regards the differences in the floral parts, with a statement and brief discussion of observed differences.

**Plasmolysis of epidermal cells in the leaf of *Iris germanica*.** A. GUERMOND (*Compt. Rend. Acad. Sci. [Paris]*, 166 (1918), No. 5, pp. 222-224).—Recent studies (E. S. R., 35, p. 333) are noted as carried out on epidermal cells of *I. germanica*. This plant is said to lend itself readily to a study of plasmolytic phenomena, showing with remarkable clearness their structural details, in particular the presence and constitution of the chondriome. This is seen to be made up partly of granular mitochondria and partly of long, elongated chondriosomes.

The plasmolysis produced by solutions of sodium chloride of various concentrations and by saccharose is said to give rise to a series of very characteristic phenomena, which are described.

Hypertonic solutions do not appear to act on the chondriome while the cell is alive. When the cell dies and the cytoplasm breaks up, freeing the chondria in the liquid of the cell cavity, the mitochondria swell up and cause the appearance of large vesicles.

**Selected cycles in *Gymnoconia peckiana*.** G. F. ATKINSON (*Amer. Jour. Bot.*, 5 (1918), No. 2, pp. 79-83).—The author briefly presents data claimed to show that *G. peckiana* is an example of a species in which the life cycle is not permanently fixed. In its more southern distribution it is generally, if not always, a one-generation cycle species and in its more northern distribution, oftener, perhaps usually, a two-generation cycle species. Its habit in the intermediate region is probably determined by local and seasonal temperatures at the time of the germination of the ascidiospores. The bearing of the observed facts on the nomenclature of the fungus is briefly discussed.

## FIELD CROPS.

[Report of field crops work in Louisiana, 1917], C. E. HESTER and F. F. QUEREAU (*Louisiana Stas. Rpt.*, 1917, pp. 18-20, 22-24).—This reports the continuation of work previously noted (E. S. R., 37, p. 529).

In fertilizer tests made at Calhoun, acid phosphate was found to produce a slightly higher yield of both cotton and corn than rock phosphate in a three-year rotation of cotton, corn, and a legume, and crimson clover followed by velvet beans.

Sentell White Dent, Hastings Prolific, and Gandy Prolific, with respective yields of 29.2, 28.7, and 28.3 bu. per acre, were first in corn variety tests. In percentage of grain, the leading varieties were Rogers with 88.2, Calhoun Red Cob (Crumpton) with 87.7, and Calhoun Red Cob (supple) with 87.3 per cent. The maximum yield of corn in fertilizer tests, 25 bu. per acre, was obtained from an application of 100 lbs. each of acid phosphate and nitrate of soda, while the lowest yield, 10 bu. per acre, followed a 300-lb. application of acid phosphate alone.

The highest yielding cotton varieties were Brown No. 1 with 1,331 lbs. of seed cotton per acre, Cleveland Big Boll with 1,326 lbs., and O'Bannon North with 1,319 lbs. The lint percentages were 27.75, 25.5, and 30.75, respectively. In fertilizer experiments with cotton, an application of 100 lbs. of cottonseed meal per acre gave a 3-year average increase of about 200 lbs. of seed cotton. Applications of 200, 300, and 400 lbs. produced only small increases over the 100-lb. application. Acid phosphate at the rate of 100, 200, 300, and 400 lbs. per acre resulted in average increases of from 136 to 212 lbs. of seed cotton per acre for a three-year period.

Experiments to determine the best method of growing velvet beans with corn are described, in which the beans were grown between the hills in the corn rows and in rows alternating with corn. The corn yields for the two seasons of planting were 18.8 and 11.6 bu. per acre, respectively, and the velvet bean yields 360 and 1,200 lbs. per acre.

Sweet potato variety tests are noted in which the different sorts were grown from slips or draws and from cuttings or vines. The yields from the slips ranged from 137.8 bu. per acre for Running Hooley to 190.3 bu. for Triumph, and from the cuttings they ranged from 23.4 bu. for Key West to 84 bu. for Jersey Yellow.

The results of fertilizer experiments with rice conducted at Crowley in cooperation with the U. S. Department of Agriculture have been summarized as follows: Two-hundred-lb. applications of 16 per cent acid phosphate appeared to give the best results with late varieties such as the Japans and Wright. It was not found profitable to grow rice more than five or six years in succession although the use of phosphate fertilizer. Acid phosphate is deemed best for crops on reclaimed marsh land. Nitrogen was used to advantage on early varieties such as Honduras, while small applications were regarded as suitable for later varieties on land in a badly run-down condition. Commercial potash seemed unnecessary. Most rice lands are said to need organic matter, and mixed fertilizers were found to be the most profitable.

Long rotations are said to be more profitable than short rotations in rice growing, due to the expense and labor involved in changing from rice to high-crop changes. Measures which have been found effective for the reduction of weeds include early mowing of rice stubble; the use of winter cover crops; and for land badly infested, clean cultivated crops. "Straight head" in rice is thought to occur largely on land planted to a highland crop the previous year and which contains a large amount of organic matter. Observations are said to indicate that straight head does not occur on fields which have been tilled and allowed to become dry some time during the growing season, and it does not appear to affect rice watered late in the season. The exact nature of the trouble has not yet been determined.

The Woburn field experiments, 1916). J. A. VOELCKER (*Woburn Expt. Sta. Rept. 1916*, pp. 1-19; *Jour. Roy. Agr. Soc. England*, 77 (1916), pp. 245-251). In continuation of work previously noted (E. S. R., 37, p. 229), this reports results of field crops work for the season of 1916, a season marked by seasonal and generally unfavorable weather conditions, especially for the cereal crops.

The highest wheat yield in the continuous wheat tests was obtained from the plot receiving farmyard manure and amounted to 15.7 bu. of grain and 1,072 lbs. of straw per acre. Rape dust showed the next highest yield, 14.8 bu. of grain and 1,645 lbs. of straw. The average yield for the unfertilized check was amounted to 6.4 bu. of grain and 714 lbs. of straw per acre. Ammonium nitrate used alone failed to give increased yields over the unfertilized plots, but when used in conjunction with lime or lime and minerals (acid phosphate and sulphate of potash) combined, increases resulted amounting to from 1.1 to 1.5 bu. per acre over the check plots. It has been concluded that ammonium nitrate and 1 ton of lime per acre will give good results, the beneficial effects of the lime being in evidence for at least 10 years, but that 10 cwt. of lime per acre is insufficient and 4 tons per acre excessive. The use of nitrate of soda and minerals resulted in 14.5 bu. of grain per acre, as compared with a yield of 14 bu. from ammonium sulphate used with mineral manures and lime. Applications of 1 and 2 cwt. of sodium nitrate used alone showed increased

yields over the untreated checks of 2 and 4.6 bu. per acre, respectively. With potassium sulphate and nitrate of soda there was a yield of 10.1 bu. per acre, as compared with a yield of 9.7 bu. per acre with acid phosphate and nitrate of soda.

The average yield of barley for the unfertilized plats in continuous tests amounted to 12.1 bu. of grain and 1,008 pounds of straw per acre. The highest yield was secured from farmyard manure and amounted to 32.6 bu. of grain and 2,836 lbs. of straw, while the plat receiving mineral fertilizer and nitrate of soda was second with 31.9 bu. of grain and 2,878 lbs. of straw per acre. Mineral fertilizers alone showed 17.3 bu. of grain per acre. The potassium ammonium sulphate alone, as usual, gave no crop, but with mineral fertilizer and 2 tons of lime of recent application there was a yield of 24.2 bu. per acre, and increases over the untreated checks amounting to from 5 to 11.2 bu. per acre. With 4 tons of lime applied in earlier years. With double the amount of animal manure sulphate used with minerals and 4 tons of lime the yield was 24.7 bu. per acre. Applications of 1 and 2 cwt. of nitrate of soda gave yields amounting to 30.0 and 24 bu. per acre, respectively, while the addition of mineral manures resulted in yields of 26.4 and 31.9 bu. per acre, respectively. It has been concluded that an increase of from 5 to 6 bu. of grain and of from 5 to 7 cwt. of straw per acre can be expected from an application of 1 cwt. of nitrate of soda. With sulphate of potash and nitrate of soda the yield was 29.8 bu. per acre, as compared with 27.9 bu. from acid phosphate and nitrate of soda. All the barley was considered to be of rather inferior quality.

In rotation experiments to compare the unexhausted manurial value of straw (chaff and outs) and cake (linseed and cottonseed cake mixed), these were fed to sheep in addition to equal quantities of roots per acre for each of the experimental plats and the residual value measured by the yield of crops in 1916. The corn-fed plat gave a yield amounting to 25,116 lbs., as compared with 30,560 lbs. from the cake-fed plat.

In 1916, wheat followed green crops pastured by sheep in 1915 and gave yields amounting to 8.1 bu. after tares, 10.2 after rape, and 11.3 after mustard. Winter and spring wheat were grown on plats receiving (1) 2 tons of manure, (2) 2 tons of lime, and (3) no treatment. The 1916 yields of winter wheat amounted to 38.6, 33.3, and 36.3 bu. per acre, respectively, with total nitrogen contents of 1.9, 1.8, and 1.74 per cent, respectively. The spring wheat gave yields of 29.2, 24, and 27.1 bu. per acre, with nitrogen contents of 1.57, 1.47, and 1.65 per cent, respectively.

Barley was grown on plats receiving humogen (bacterized peat) for comparison with its equivalent in farmyard manure. Yields resulted of 41.8 bu. per acre for farmyard manure, 34.7 bu. for humogen, and 32.2 bu. for the untreated check.

The total yield of hay for a clover and grass mixture containing "white" white clover for the 4 years 1913-1916 amounted to 22,628 lbs. per acre, as compared with a yield of 20,239 lbs. from a mixture containing "ordinary" white clover.

Variety tests with alfalfa on large plats are reported for the 4-year period 1912-1915, with the Russian (Europe) giving the highest yield, 32,979 lbs. when sown alone and 31,644 lbs. when sown with barley as a nurse crop. Small plats of Sterling Montana, Sterling North Dakota, and Grimm alfalfa yielded 67.5, 85, and 91 lbs. of hay per plat, respectively, in 1916.

Experiments on the improvement of old pastures and tests of varieties of forms of lime for grass land were continued in 1916. The highest hay yield was obtained from the plat receiving 12 tons of manure and amounted to 27.5 lbs. per acre, as compared with a yield of 4,284 lbs. from the untreated check. The results of the lime experiments were deemed inconclusive.

**Live stock v. grain farming.** C. G. WILLIAMS (*Ohio Sta. Bul.*, 1918, pp. 1-24).—This forms a preliminary report on experiments begun in 1910 on a large tract comprising a comparison of grain and live stock systems of farming and their relative ability to maintain soil fertility. On one-half of the tract a rotation of corn, soy beans, wheat, and clover is employed, and the remaining half is farmed in live stock, using the same crops. In the live stock system all the crops grown except the wheat and clover seed are either fed to the stock or in a box stall with a cement floor or pass into the manure as bedding. An average of 3.34 tons of manure has been produced each year, and this is applied to the corn area the following spring. In the grain-farming system the grain and seed crops are sold and all of the roughages, including corn stover, soy bean and wheat straw, and clover, returned to the soil. In addition both tracts of corn receive 400 lbs. of acid phosphate and 2 tons of ground limestone per acre, and both wheat tracts receive 300 lbs. of acid phosphate per acre. The areas are drained and receive identical treatments as to cultivation and seedling.

The results of the experiments are reported for each crop and by sections or rows, showing the yields and the gain or loss in the live stock system as compared with grain farming for each year of the 8-year period 1910 to 1917, inclusive. The average gains in grain yields for live-stock farming have been as follows: Corn, 6.01 bu.; soy beans, 2.89 bu.; and wheat, 3.66 bu. By dividing the crops grown on each section into two periods, the same crops having been grown in each period, the average gain of live stock farming over grain farming was found to be 18.2 per cent for the first period and 7.2 per cent for the second period. A study of the nitrogen balance in the soil under the two systems showed a net gain per acre per rotation of 38 lbs. of nitrogen for grain farming and 624 lbs. for live-stock farming.

The labor requirements in live-stock and grain farming are compared and the relative profits of the two systems briefly discussed, but no conclusions are reached.

**Report on the breaking up of grass land in England and Wales in the harvest year, 1916-17.** T. H. MIDDLETON and R. G. WHITE (*Ibid.*, *Agr. and Fish.* [London], *Misc. Pub.* 19 (1917), pp. 37).—This presents a summarized report of replies to inquiries from 55 counties in England and Wales on the breaking up of long-established grass lands in an effort to increase the total food production of Great Britain.

Practically 80 per cent of all attempts were reported as successful in obtaining notable crop production on sod land. Approved methods of soil preparation and fertilization for various soil types are briefly outlined.

**The breaking up of grass land.** T. H. MIDDLETON (*Jour. Bd. Agr.* [London], 1917, No. 6, pp. 605-614).—A partial reprint of the report noted above.

**A new case of metaphanic variation in grasses and its significance.** J. DREYER (*Jour. Wash. Acad. Sci.*, 7 (1917), No. 17, pp. 535-537).—The author reports the careful examination of hundreds of *Dactylis glomerata* and *D. glomerata ramosa* in a meadow at Barèges, Hautes-Pyrénées, France, which resulted in the discovery of (1) two inflorescences bearing sterile spikelets analogous to the sterile ear of *Zea tunicata*, described by Collins (E. S. R., 37, p. 536), and (2) a case of metaphanic variation which revealed ancestral characters. These variations are described as follows:

"Green foliage organs, 23 to 25 mm. long, developed between the glumes, some of which yielded ♂ and ♀ reproductive organs. Some of the foliage organs enclosed normal, rudimentary, or abnormal stamens and pistils, or rudimentary leaves developed where pistils should have been. . . . Successive transverse sections displayed all gradations in the forms of ♂ reproductive

organs from the microsporangia of thallophytes to the stamens of flowering grasses.

"Twelve microsporangia were imbedded in the parenchymatous tissue at the base of the foliage organ, which was thus a true homologue of the thallus of nonflowering plants. Some of these microsporangia were rudimentary and contained cells scarcely different from the parenchymatous neighboring cells, while others contained pollen grains surrounded by nutritive cells. In the upper sections these microsporangia became more and more individualized and were freely grouped two by two as stamens."

From the observations recorded it is concluded that "organs of grasses were at first all fertile, but most of them became sterile under the pressure of biologic factors. The vegetative activity overshadowed the reproductive activity, and most organs become assimilating organs, viz, leaves. A few remained fertile and responded in diverse ways to their reproductive specialization, attaining their greatest differentiation in ordinary maize."

**Grasses and leguminous crops in New York State** (*N. Y. Dept. Agr. Bul. 1* (1916), pp. 2507-2592; figs. 127).—This is a compilation of information relating to the production of the principal hay and pasture grasses and of leguminous and nonleguminous forage crops in New York, together with notes on the diseases and insect enemies of timothy, alfalfa, and clover.

**Midsummer forage crops**, C. G. WILLIAMS (*Mo. Bul. Ohio Sta., 3* (1918), No. 6, pp. 169-172, figs. 2).—Soy beans, millet, Early Amber sorghum, and Sudan grass are recommended as valuable emergency crops for seeding during June to furnish dry forage for winter feeding. Brief notes are presented on methods of seeding, and suitable varieties of soy beans and millet are indicated.

**Selecting cover crops for fall planting**, F. A. WELTON (*Mo. Bul. Ohio Sta., 3* (1918), No. 7, pp. 209-212, figs. 5).—This presents a brief summary of tests with 14 different leguminous and nonleguminous cover crops and 6 combinations of crops seeded during midsummer in corn in connection with experimental weeding noted on page 531. The observations were made with particular reference to winterkilling, and covered a period of 9 years.

Hairy vetch was found to be the best legume, and rye the best nonlegume, while a mixture of the two also gave good results. Rape is said to have given satisfactory results in favorable seasons.

**Food needs for 1919: Fall-sown wheat and rye** (*U. S. Dept. Agr., Office of Circ. 103* (1918), pp. 13).—As a part of the agricultural program for the future, beginning with the autumn of 1918, recommendations are made for increasing the winter wheat acreage by from 7 to 12 per cent. for the country as a whole over the acreage sown last fall, and for increasing the rye acreage by about 1 per cent. Tabulated statements are presented showing the increases suggested for each State. Cultural notes are included.

**A forgotten cereal of ancient America**, W. E. SAFFORD (*Separate from Proc. Internat. Cong. Amer., 19* (1915), pp. 286-297, pls. 2, figs. 4).—The author discusses the ceremonial and economic uses of a white-seeded *Amaranthus* as described by Watson under the name of *A. leucocarpus*, among the Indians of Mexico and the southwestern United States. Notes on the methods of cultivation and harvesting, and the preparation of the seed for food in North and South America, Asia, and Africa, are included.

**The agricultural species of bent grasses**, C. V. PIPER and F. H. HINMAN (*U. S. Dept. Agr. Bul. 692* (1918), pp. 27, figs. 11).—Part 1 of this bulletin, prepared by Piper, deals with the identity and agricultural characteristics of Rhode Island bent and immediately related grasses, namely, redtop, florin, velvet bent, and "creeping bent." Redtop, Rhode Island bent, and creeping bent are said to have been handled commercially by seedsmen in a mixture known as Scotch

German mixed bent. It is believed that little genuine Rhode Island bent seed has been on the market for years. Since large quantities of this seed can be obtained from natural pastures in New England, it is thought that it will become an increasingly important product due to the high value of the grass for lawns and golf courses.

It is recommended that seedsmen employ the following common and scientific names for grasses described in this bulletin: Redtop, *Agrostis pectinatus*; Rhode Island bent and Colonial bent, *A. tenuis*; Velvet bent, *A. canina*; and South German mixed bent, *Agrostis* spp. Florin, which is not grown in this country to any extent at the present time, was always propagated vegetatively, and its exact botanical identity is not quite clear, although it is said to be distinct from both redtop and Rhode Island bent.

Part 2 of the bulletin, prepared by Hillman, deals with the distinguishing characteristics of the seeds of the species of bent which occur in the trade, the seed of redtop seed as seed of the finer bents and the importation of seeds of the finer bents under various and misleading names are discussed. The principal impurities of both domestic and imported seed are set forth for the purpose of distinguishing imported seed from that grown in this country. It is deemed most important that, either alone or mixed, redtop seed can be distinguished with certainty from Rhode Island bent seed and from South German mixed bent seed, the principal misbranding being the substitution of redtop seed for seed of one of the other bents.

Cultivation and utilization of barley, H. V. HARRIS (*U. S. Dept. Agr., Farmers Bul. 968 (1918), pp. 39, figs. 10*).—The soil and climatic requirements of barley are discussed, and the field practices and cultural methods employed in production are described in detail. The utilization of the crop for human and as feed for stock is outlined.

Barley regions in the United States differing in economic, cultural, and various aspects are designated as arid or western, humid-spring or northeastern, and humid-winter or southeastern. The predominant types deemed best for each region are said to be the Coast for the arid region, the Manchuria and Debrucker for the humid-spring region, and the Tennessee Winter for the humid-winter region. Other varieties have been found to be particularly adapted to more restricted localities. Barley diseases are briefly noted with special reference to covered smut and its prevention.

Influence of position of grain on the cob on the growth of maize seedlings, H. H. HALSTED and E. J. OWEN (*Jour. Amer. Soc. Agron., 9 (1917), No. 6, pp. 57-64*).—This paper, a contribution from the New Jersey Experiment Station, reports observations on the relationship of the position of the grain upon

the cob to weight of grain, specific gravity of grain, emergence of seedlings, viability of seed, weight of seedlings, length of seedlings, and variability in growth. Five ears from each of 20 representative varieties and crosses of corn were employed in the experiment, the grain from each ear being divided into five equal lots, each representative of a zone of the ear ranging from butt to tip. The average weight of the grains in each zone of 2 of the 5 ears was determined and then 25 kernels from each lot planted an inch deep in a greenhouse. The kernels for planting were taken at random, except that in the butt and tip zones the smallest, perfect kernels were used. The plants were harvested after 17 days. The emergence of the tips of the seedlings was recorded daily and viability and weight and length of seedlings determined at harvest time.

The results obtained are discussed for each character under consideration and detailed data given on the average weight of kernels and on the vigor of



the seedlings as indicated by their live weight. The average results of the seven characters studied rank as follows:

*Relative rating of different zones of the corn ear as regards various characters.*

Character.	Zone.								
	1 (butt).	2	3	4	5	6	7	8	9
Weight of grain.....	9	10	8	7	6	5	4	3	2
Specific gravity.....	4	5	7	8	9	10	6	3	2
Emergence.....	1	10	9	8	6	7	5	2	4
Viability.....	1	3	4	10	7	9	6	8	2
Vigor.....	2	9	8	10	7	6	5	4	3
Length of seedling.....	2	3	9	10	8	7	6	5	4
Variability.....	10	8	3	5	4	2	6	1	7

The authors conclude that "a practical application of the results . . . would consist of germinating a liberal sample, say 20 kernels, from 2 rows upon opposite sides near the middle of the ear. Select only those ears that show practically 100 per cent viability and plant from only the middle of the ear—that is, reject all grains of the butt zone and of the 4 zones of the upper portion of the ear."

Experiments with single-stalk cotton culture in Louisiana, Arkansas, and North Carolina. P. V. CARDON (*U. S. Dept. Agr. Bul. 526 (1918), pp. 31*). This reports the results of a series of 21 experiments with the single-stalk method of cotton culture, as compared with older methods, made in nine parishes and counties of Louisiana, Arkansas, and North Carolina during 1915 and supplementing similar work previously noted (*E. S. R.*, 33, p. 730). The experimental work was conducted by the Bureau of Plant Industry and the States Relations Service in cooperation with farmers and was largely in the nature of a demonstration. The results obtained are discussed separately for each center, and may be briefly summarized as follows:

"The lint percentage, size of the seed, lint index (grams of lint on 100 seeds), and the grade and length of lint remained about the same for the different systems of culture. Single-stalk culture gave greater total yields in 18 of the 21 instances, greater yields at the first picking in 16 of the 21 instances, greater yields at the second picking in 9 of 11 instances, and greater yields in the only instances where third pickings were made. While some of the differences were so small as to be insignificant in themselves, there was a general increase throughout the entire series of experiments; in several instances by more than 20 per cent.

"Eliminating for the present those experiments in which it is known that the thinning of the single-stalk rows was done too late, those in which the stands were generally poor and single-stalk culture was applied to only the short spaces in the rows where the stand permitted the application of the new system, those in which there is no assurance that single-stalk culture was properly applied, and those of which the reports are defective, there remain at least five experiments (three in Louisiana and two in North Carolina) that may be considered as fairly reliable tests of single-stalk culture. The yield of seed cotton from these favored the new system by 20 to 39 per cent."

Irish potato breeding. C. C. NEWMAN and L. A. LEONIAN (*South Carolina Sta. Bul. 195 (1918), pp. 3-28, figs. 19*).—This bulletin presents a preliminary report on work with first-year seedlings of Lookout Mountain potatoes in an effort to develop a strain suited to propagation as well by seeds as by tubers. This variety is said to be unusually prolific, producing on the average 8 bu. of seed

per acre. Observations on vegetative growth and seed production are held to indicate that there is no correlation between these two characters, the most tuber production, the greatest vegetative growth, and the largest seed production usually occurring in the same plant. While the time of planting greatly affected the amount of vegetative growth and tuber production, it was held to have no influence upon the blooming and seeding of this variety. The seeds were harvested during October, 1916, sown in beds in the greenhouse in February, 1917, and later transferred to the field. Variations observed in seedlings are briefly discussed and said to be strongly indicative of a chlorizin of the seed. The seedlings possessed from 2 to 4 seed leaves and grew from single slender vines to very stocky and profusely branched plants. One of 1,916 seedlings was harvested, and the seedling tubers were classified according to yield, size, color, and condition. The predominant color of the seed was cream, as against pink and cream with pink eyes. The average yield per tuber was about 0.5 oz., and the average number of tubers per hill about 22.

**Color variation in the potato blossom.** J. F. LUNDHOLM (*Scandinavian Potato Journal*, No. 27 (1917), No. 1, pp. 43-45).—The observations of Wacker<sup>1</sup> upon the presence of new lines with variations in flower color within vegetative lines of potatoes led the author to present similar observations from his own studies. From a vegetative line obtained from an apparently white-flowered plant of Professor Wollmann No. 34 is described, the flowers of which were also white. Later observations with certain flowers, however, traces of the red color of another variety still persisted, and it was concluded that in reality it was only a question of indefiniteness of the flower color. That this may also be true in other varieties was demonstrated by the magenta flower color of the Nilsson von Nole variety, which in certain years was so completely changed to white that in many plants none at all, and in some only traces, of the true red color was to be found. According to the author's observations, other characteristics of the potato plant, such as size and form, could be attributed either to accidental modifications.

**Seed potato experiments and variety studies.** T. C. JOHNSON and J. T. ROSA, *Virginia Truck Sta. Bul. 24* (1917), pp. 509-523).—Experimental work conducted at Norfolk and on the Tasley substation is described, comprising tests with seed potatoes from different sources and with seed pieces of different sizes, studies upon the relation of the size of seed piece to the number of stalks, the yield per hill and the proportion of cull tubers, and tests with early crops.

Seed stocks tested were obtained from potatoes grown in Aroostook Co., Me.: from material grown locally in the fall from northern-grown seed produced the previous year and held in storage until July, when it was sown; and from potatoes grown locally in the spring of the preceding year from northern-grown seed. Seed obtained from Maine germinated two weeks earlier than that grown in Virginia, although the latter eventually gave a slightly better stand, while seed grown in Virginia the previous spring failed to give satisfactory results. Cut seed germinated more quickly than did whole seed. Maine seed outyielded the fall home-grown seed in every instance at the first harvest, at the second harvest the two classes were nearly equal, but at the third digging the home-grown seed heavily outyielded the Maine seed.

Tests with different-sized seed pieces were made at Norfolk during 1916 and 1917 with seed obtained from Maine and with locally-grown fall-crop potatoes

<sup>1</sup> *Ztschr. Pflanzenzücht.*, Vol. 4, No. 3.

of the previous year. The results are held to indicate the advisability of using larger seed pieces than are now generally employed. The continued use of small home-grown tubers for seed is deemed inadvisable. In similar tests conducted at Tasley in 1917 with fall home-grown seed, the best results were obtained from 1.5-oz. tubers planted whole. Larger tubers appeared to give smaller returns when planted whole.

Plants grown from whole seed at Norfolk showed more stalks than did the plants from cut seed, the average number of stalks increasing with the size of the seed piece. All sizes of Maine-grown seed tubers produced more stalks than did the corresponding sizes of the home-grown seed.

Of 29 varieties of early potatoes tested in 1916 only 4 yielded more than Irish Cobbler, the check variety, at the first harvest, while Eureka was the only variety which gave higher yields at the second and third diggings, though several varieties gave slightly better yields at the fourth digging. The results are held to demonstrate the superiority of the Irish Cobbler for extra-early and early crop purposes, both in point of yield and in the small proportion of culls.

**Physiological basis for the preparation of potatoes for seed.** C. O. ARTHUR (Maryland Sta. Bul. 212 (1918), pp. 79-102, figs. 11).—The author briefly discusses the rest period in potatoes, dealt with in more detail elsewhere (E. S. R. 32, p. 129), and suggests a practical method for shortening the period. The influence of terminal buds on the growth of other buds on the tuber is discussed, and the conclusion is reached that terminal eyes suppress or retard the growth of other eyes on the tuber, the same relationship also existing between the central and lateral buds of the eye. The degree of growth inhibition is said to be influenced by the variety, the size of tuber, the vigor of terminal sprouts, and external conditions. Photographs are presented showing the operation of internal growth-inhibitory influences, which are deemed worthy of careful consideration in formulating a practical procedure for cutting tubers for seed.

Experimental work is described in which observations were made on the seed value of eyes on different parts of the tuber, the best size for seed pieces, the best method of cutting the tuber, and on the value of sprouting tubers before planting. The data are presented in tabular form and briefly discussed. Conclusions and recommendations based on the results secured may be summarized as follows:

The eyes on the stem half of the tuber were shown to be capable of producing vigorous sprouts if their connection with the terminal eyes was severed, and when all variables in seed preparation were eliminated they are said to have been as valuable for seed as eyes on the terminal half of the tuber. The value of the sprout was found to depend upon the size of the seed piece, and within certain limits the yield increased directly with the weight of the seed piece. A reduction in the size of the seed piece below 1.5 oz. is deemed inadvisable, while it may be profitably increased considerably above 1.5 oz. Ordinary seedlings produced such weak plants and poor stands that the resulting crop did not pay for the use of the ground.

The number of eyes on the seed piece, as a rule, bore no direct relation to the number of stalks that appeared. Under normal conditions most varieties did not produce enough stalks from any sized piece to cause serious crowding if only one piece was planted in a hill and the hills were not too close together. Seeding in hills 12 in. apart is thought to be best for average conditions. In cutting tubers for seed the size of the piece is said to be of greater importance than the number of eyes per piece. Buds near a cut surface produced sprouts more quickly than did those in the middle of the piece, and the sprouts as

more rapidly. A graphic scheme is presented for cutting different sized pieces to the best advantage.

Use of seed bearing short, vigorous sprouts resulted in earlier growth usually in higher yields than that of seed bearing only dormant eyes. The use of large whole tubers is regarded as of little value, since most of the remain dormant under the usual conditions of sprouting. Short vigorous ones should not be rubbed off before planting, but long sprouts are deemed of value unless the tubers are "sun sprouted" or sprouted in the dark under favorable growing conditions. When small whole tubers are to be for seed, sun sprouting or sprouting under wet sawdust is regarded as a better procedure under certain conditions, especially for garden practice.

**Production of potatoes from potato skins.** G. CASRYN (*Bull. Quind. Inst. Agr.,* 22 (1917), No. 3, pp. 44-49; *ibid.*, in *Internat. Inst. Agr., Internat. Conf. and Trans. Agr.*, 8 (1917), No. 1, p. 529).—Experiments are briefly given on the production of potatoes from potato skins cut into strips (approximately 0.2 in. (0.08 in.) thick as compared with seedling whole tubers. From 100 lbs. weight of potatoes 45.5 parts of skin were obtained for planting, remainder being available for food or commercial use.

Square plots of 360 square meters (3873.6 sq. ft.) each were seeded with potatoes and with skins of the same variety, respectively, the rate of planting 24.57 kg. (54.05 lbs.) for the skins and 54.5 kg. for the whole tubers. The average yield of all parts planted with skins amounted to 286 kg. (278.5) and of those planted with whole potatoes to 288 kg.

**Potatoes in Canada: Its cultivation and varieties.** W. T. MASON (*Canadian Farmers Bul.* 90, popular ed. (1918), pp. 16, figs. 31).—Cultural methods and practices deemed best for growing potatoes in Canada are outlined in a far manner, the recommendations being based largely upon experimental conducted at the Central Experiment Farm during the past 30 years, as well from time to time (C. S. R., 38, p. 634), together with the results obtained in similar work done elsewhere. Measures for protecting the crop from insects and fungus diseases are described, and brief notes are given on digging potatoes, storage, irrigation, and the cost of production, these are recommended for different sections of the country.

**Fertilizer experiments with rice.** A. W. K. DE JONG and C. VAN ROSSUM (*Landbou. Nijr. en Handel [Dutch East Indies], Meded. Agr. Chem. Lab.,* 1917), pp. 46, figs. 3).—Extensive fertilizer experiments with rice during 1916 are reported, and included a comparison of ammonium sulphate, calcium sulphate and sodium nitrate, tests with molasses, studies of the effect of sulphur on rice production, a comparison of the immediate and after effects of phosphorus with those of acid phosphate, tests with more frequent applications of acid phosphate, and a comparison of slaked lime with calcium nitrate.

It is concluded that calcium nitrate is nearly equal to ammonium sulphate in stimulating rice production, although its effects are not quite so apparent. Multiple applications of sodium nitrate give good results, that molasses is suitable for rice production, that the use of sulphuric acid had no harmful effect upon rice, that a three-fold application of rock phosphate appeared to be equivalent to one application of double superphosphate, that more frequent applications of acid phosphate gave no significant increase in yield, and that lime carbonate appeared to stimulate rice production.

**Winter grain sorghums in the San Antonio district of Texas.** C. R. LUTTRELL (*U. S. Dept. Agr., Farmers' Bul.* 965 (1918), pp. 12, figs. 4).—Based on experimental work done on the San Antonio Experiment Farm, the growing of

grain sorghums in this region is recommended as a substitute for wheat in rotation to the grain crops usually grown. Average yields of oats, dwarf milo, and feterita grown in rotation from 1911 to 1917, inclusive, amounted to 26, 26, and 30.4 bu. per acre, respectively. Dwarf milo and feterita are the best because of their early maturing qualities which enable them to escape the ravages of the sorghum midge. Directions are given for growing the crops.

**How to use sorghum grain.** C. R. BALL and B. E. ROTHGER (*U. S. Dept. Agr., Farmers' Bul.* 972 (1918), pp. 18, figs. 7).—The value of sorghum grain as feed and as human food is discussed. The grain is said to have placed 10 per cent of the feeding value of corn, to be relished by stock and poultry, and suitable for use as human food in every way that corn meal is used. The necessity of thorough drying and cleaning of thrashed grain is emphasized, and storage in well-ventilated bins is recommended. Directions for sowing are included.

**Something about sugar: Its history, growth, manufacture, and distribution.** G. M. ROLAN (*San Francisco: John J. Neubegin, 1917*, pp. 114, figs. 147, figs. 41).—The author gives a comprehensive account, profusely illustrated, of the history of sugar production from cane and beets in different parts of the world and describes in detail the various steps in preparing the cane for use.

**Analysis of canes damaged by fire.** A. URICH (*La Planter*, 59 (1917), p. 92).—An analysis of juice from canes damaged by fire and ground 10 to 15 days afterwards is presented and compared with an analysis of sugar cane from the same district.

The normal juice varied in purity from 82.8 to 87.1 per cent, in sucrose from 16.48 to 18.06 per cent, and in glucose from 1.28 to 1.67 per cent. One day after the fire the juice from the damaged cane showed 85 per cent purity, 14.21 per cent sucrose, and 1.47 per cent glucose, while on the tenth day afterwards the analysis showed 76.9 per cent purity, 15.09 per cent sucrose, and 2.01 per cent glucose.

**Sweet potato storage.** H. C. THOMPSON (*U. S. Dept. Agr., Farmers' Bul.* 971 (1918), pp. 27, figs. 15).—This describes in detail successful types of sweet potato storage houses and their construction. It presents a list of types required for houses of different sizes; discusses the utilization of houses, tenant houses, warehouses, etc., for storing sweet potatoes; indicates the variety deemed best for market; outlines proper methods for handling the crop from harvesting to marketing; and gives directions for the use of outdoor cellars and banks for storage purposes for those growers unable to build storage houses.

**Tobacco seed.** H. JENSEN (*Profstat. Vortsteland, Tabak* [Dutch East India Meded. 28 (1917), pp. 53-87, pls. 3).—General characteristics of tobacco seeds are fully discussed and considerable tabulated data presented comparing the yield of seed from large and small seed pods and of ripe and unripe seed. The effect of pinching out the poorly developed flowers of the clusters upon the bearing of seed plants and upon seed production was also noted. The value of cleaned seed is emphasized. A device used at the station for cleaning seeds by means of an air current is described and illustrated.

**Velvet beans.** S. M. TRACY and H. S. COE (*U. S. Dept. Agr., Farmers' Bul.* 970 (1918), pp. 1-30, 37, figs. 14).—These pages discuss the origin and distribution of velvet beans in the South and present brief descriptions of the principal varieties. Cultural methods and field practices employed in growing the crop are outlined in detail, and the utilization of the crop for hay, as a summer crop, as silage, for grazing purposes, and for soil improvement is indicated. A section on insect pests is included.

**purple vetch.** R. McKEE (*U. S. Dept. Agr., Farmers' Bul.* 967 (1918), pp. 12,

24-25).—This describes the adaptations and the production of purple vetch (*atropurpurea*), with particular reference to its use as a green manure in the southwestern part of the United States and as a seed crop in northern Oregon. It is said to be less winter hardy than either common or green vetch.

**color classification of wheat** (*Jour. Amer. Soc. Agron.*, 9 (1917), No. 6,

24-25).—A scheme of classification proposed by a committee of the Minnesota section of the American Society of Agronomy, consisting of H. K. Hayes, H. Bailey, A. C. Arny, and P. J. Olson, is briefly reviewed.

The scheme consists of two columns headed Pigmentation and Physical Condition or Density. Under pigmentation the terms "red," to denote the presence of brownish-red pigment in the bran layer, and "white," to denote the total absence of pigment, are to be used. Red may be modified by the prefix "light" when the degree of pigmentation is less than normally occurs in wheats. Under physical condition or density it is proposed to employ terms denoting the several gradations of endosperm density, namely, mealy, submealy, substarchy, and starchy.

**new wheat for Kansas.** W. M. JARDINE (*Jour. Amer. Soc. Agron.*, 9 (1917), pp. 257-266).—A new wheat strain, previously referred to (E. S. R., 24, 44), and known as Kanred, the product of a single-head selection from Kan (No. 1435 of the Office of Cereal Investigations, U. S. Department of Agriculture), is described.

The variety was developed in 1906 by the department of botany, Kansas State Agricultural College, and has been grown on the agronomy plots of the S. S. Station since 1910 and since 1914 at the Hays, Colby, and Garden City stations and in cooperation with farmers throughout the hard winter wheat belt. Other agronomic data relative to Kanred, Turkey, and Kharkov strains from 1911 to 1916, inclusive, are tabulated, together with data from milling and baking tests at Manhattan from 1912 to 1915, inclusive.

Kanred is described as "a hard winter variety, characterized by the presence of whitish, glabrous glumes, and reddish grain of the well-known Crimean variety type."

Average yields for the period of 1911-1916 at Manhattan amounted to 31.1 bu. for Kanred, 26.5 for Turkey, and 25.9 for Kharkov. Average yields at Hays for 1914 and 1916 were 31 bu. for Kanred and 28 bu. for Turkey. At Garden City Kanred, Turkey, and Kharkov gave average yields of 16.3, 14.6, and 14.1 bu. per acre, respectively, for 1915 and 1916, while at the Colby substation Kanred gave an average yield of 38.5 bu. and Turkey 31.3 bu. for the same period. In 54 cooperative tests Kanred has given an average increase of 4 bu. per acre over the local strains.

It was concluded from observations at Manhattan that Kanred headed and matured on the average one day earlier than Turkey and more than one day earlier than Kharkov. The new variety is also deemed resistant to winter injury, 90 per cent of the Kanred plants surviving the winterkilling which occurred in 1912 as compared with 80 per cent for Turkey and 77 per cent for Kharkov.

It is concluded from the milling and baking tests that Kanred compares favorably with Turkey and Kharkov in all essential points, appearing to be superior to the standards in protein and gluten content.

The "hoop" method of harvesting experimental plots is briefly noted, whereby 100 plants on each plot are inclosed by a hoop of approximately 42 in. in diameter, enclosing a total area of 0.05 acre, and harvested. This method is deemed to be equivalent to harvesting the entire plot.

**Fertilizing the wheat crop.** C. E. THORNE (*Mo. Bul. Ohio Sta.*, 3 (1917), pp. 199-203).—This briefly reviews the results of fertilizer tests which were made in 12 counties in Ohio for periods ranging from 1 to 24 years. The wheat was grown in rotations in which it followed corn, oats, or soy beans and, in turn followed by clover or clover and timothy.

An average increase in yield was obtained of more than 4 bu. per 100 lbs. of acid phosphate used alone. With the addition of muriate of potash to acid phosphate, a further increase of 2.4 bu. per 100 lbs. of muriate was secured, and with the addition of nitrate of soda an increase of 2.97 bu. per 100 lbs. of nitrate over acid phosphate alone. The hay crops following the wheat also showed increased yields amounting to 542 lbs. per 100 lbs. of acid phosphate used alone, 1,408 lbs. more for the addition of 570 lbs. of muriate of potash, and 2,476 lbs. for the further addition of 1,176 lbs. of nitrate of soda. Even at pre-war prices of fertilizers, however, the increased yields obtained from the use of potassium and nitrogen in addition to phosphorus were at a lower net gain than that secured from the use of acid phosphate alone. It is suggested that manure be largely employed as the carrier of potash, nitrogen and that it be reinforced with acid phosphate applied separately mixed with the manure.

**Wheat experiments, season 1916.** A. E. V. RICHARDSON (*Jour. Dept. Agric. Victoria*, 15 (1917), No. 4, pp. 246-254, figs. 5).—Variety and fertilizer tests on wheat at numerous experimental centers are reported in continuation of those previously noted (*E. S. R.*, 36, p. 437).

Federation, Dart Imperial, and Yandilla King gave the highest average yields in 1916. Fertilizer tests indicated that the best results were secured with liberal applications of acid phosphate.

**The handling and storage of spring wheat.** C. H. BAILEY (*Jour. Assoc. Agron.*, 9 (1917), No. 6, pp. 275-281, figs. 5).—Investigations by the Minnesota Grain Inspection Department laboratory and the State Boards of Grain Appeal made in cooperation with the division of agricultural chemistry of the University of Minnesota, are noted. About 20 lots of wheat stored in bulk but at a moisture content of from 12.75 to 17.45 per cent, were employed to assess the percentage of moisture which spring wheat may contain without rotting in storage. The observations were made on no less than car-load lots, covered a period of two summers and the intervening winter. Data are here reviewed on the relation of the rate of heating to moisture content, air temperature, location of the bin, and the original temperature of the grain. Additional data noted on changes in temperature of the grain at different depths.

The material of which the bin was constructed affected the keeping quality of damp grain in the proportion that it afforded heat insulation. The principal materials used in bin construction are ranked in heat-insulating value by the leading elevator construction companies of Minneapolis as follows: Hollow tile, wood, concrete, and steel.

It was concluded that handling wheat in bulk introduces certain dangers not met with when it is handled in sacks. Wheat harvested before well-ripe undergoes a "sweat" either in the shock, stack, or bin, but if well-dried this sweating is said to improve the baking qualities of the flour. The maximum limits of moisture which hard spring wheat may contain without danger of heating in a temperate climate are said to vary from 14.5 to 16 per cent. Whether actual heating occurs or not "depends upon several factors including the hardness of the kernels because of the relation of kernel density to gluten content, the size or dimensions of the bulk, temperature of the atmosphere, initial temperature of the grain, location and consequent exposure

tion, and the material of which the bin is constructed." See also a previous paper (E. S. R., 38, p. 538).

**Seed tests made at the station during 1916 and 1917.** M. T. MUSS (*Agri. State Sta. Bul.* 446 (1918), pp. 53).—Tabulated data are presented showing results of purity tests of 906 official samples of agricultural seeds collected during the seasons of 1916 and 1917, also a report on voluntary examinations of 1251 samples received from correspondents. Violations of the seed law were found in 5.6 per cent of the official samples analyzed, while the voluntary ones are said to have shown a decided lack of uniformity in labeling.

**Some farm weeds of Sind.** A. M. KAZI (*Punjab Agr. Col. Mag.*, 8 (1917), No. 1, pp. 179-182).—Some of the common weeds occurring in the Province are briefly described, and the local forage value noted.

## HORTICULTURE.

**American horticulture.** G. MOLOS (*L'Orticoltura Americana*, Milan: Soc. Oct. 1918, pp. XI+287, figs. 287).—An account of American horticulture, based on an inspection trip in the United States and Canada conducted at the request of the Italian Imperial Minister of Agriculture, Industry, and Commerce. Information, illustrations, and statistical data are given relative to various phases of horticulture in this country, including educational institutions, botanical gardens, experiment stations, various cultural industries, and the various horticultural products.

**Proceedings of the American Society for Horticultural Science, 1917** (*Proc. of Soc. Hort. Sci.*, 1917, pp. 206, pls. 2, figs. 8).—In addition to the routine reports are given of the following addresses and papers presented at a 49th meeting of the society, held in Boston, November 2, and at the annual meeting held in Pittsburgh, December 27-29, 1917: Observations upon Summer and Fall of the Apple and Peach, by M. A. Blake (pp. 14-23); A Plan for Co-operative College Training in Practical Horticulture, by B. S. Brown (pp. 24-26); The Production of Self-fertile Muscadine Grapes, by C. Dearing (pp. 27-30); Methods in Pure Line Selection Work with Potatoes, by O. B. Whipple (pp. 31-38); Some Correlations in Potatoes, by W. Stuart (pp. 39-45); Boron Spraying for Potatoes in the Corn Belt, by A. T. Erwin (pp. 45-50); Experiments in Selecting Tomatoes for Wilt Resistance (abst.), by C. E. Durrant (pp. 51-52); Commercial Evaporation and Dehydration of Fruits and Vegetables, by L. Kirkpatrick (pp. 52-55); Correlations Between Fruit and Foliage in Berries, by B. S. Pickett (pp. 56-59); An Investigation of the Interaction of Stock and Scion in Apples, by J. K. Shaw (pp. 59-65); Notes on Nomenclature and Classification of Currant Varieties, by P. Thayer (pp. 66-67); Variation in Apples as Determined by the Position of the Fruit in the Cluster, by O. B. Whipple (pp. 71-73); Color Development and Maturity of Few Fruits as Affected by Light Exclusion, by E. L. Overholser (pp. 73-74); Factors Influencing Rate of Discharge and the Distribution of Spray Deposits, by H. L. Crane (pp. 85-92); The Effect of Adjacent Leaf Area on the Sugar Content of Oranges, by J. E. Coit (pp. 92-93); Experimental Work on Fertility of the Apple, by W. H. Alderman (pp. 94-101); Physiological Tests of Self-fertility of the Apple, by L. I. Knight (pp. 101-105); Winter Injury to Cherry Blossom Buds, by R. H. Roberts (pp. 105-110); Federal Point of View of Demonstration Work in Horticulture and Pomology, by C. P. Smith (pp. 110-114); Factors Necessary for Successful Extension Work in Pomology, by R. W. Rees (pp. 114-118); The Role of Soil Temperature in Tree Growth, by J. Oskamp (pp. 118-126); Methods in Breeding Peaches, by C. H. Johnson (pp. 126, 127); Experiments in Horticultural Teaching, by W. L.



Howard (pp. 128-130); Report of Committee on Undergraduate Work, by B. S. Pickett (pp. 130-132); Methods of Providing Practical Work in Horticultural Courses, by S. W. Fletcher (pp. 133, 134); Courses in Pomology, Cornell University, by W. H. Chandler (pp. 135-137); Pomological Field Laboratories, by E. W. Bailey (pp. 138-140); Report of Committee on Graduate Work, by M. J. Dorsey (pp. 140-147); Olericulture as a Field for Investigation, by T. C. Johnson (pp. 147-153); The Planning of an Experiment for the Utilization of Vegetables, by C. E. Myers (pp. 153-156); Planning an Experimental Project, by W. L. Howard (pp. 156-160); Report of the Committee on Research and Experimentation, by H. J. Webber (p. 160); The Stimulating Research, by H. J. Webber (pp. 160-163); Report of the Experimental Work in Floriculture, by A. C. Beal (pp. 164-168); Report of the Committee on Research and Experimentation, by R. L. Watts (pp. 168, 169); Report of Committee on Variety Testing, by J. H. Gourley (pp. 169-178); Report of Committee on Score Cards for Vegetables, by W. W. Tracy, sr. (pp. 178-181); and The Effect of Soil Conditions on the Nitrogen Content of the Head Lettuce Plant, by H. A. Noyes and C. B. Sayre (pp. 180-183).

[Report of horticultural investigations] (*Ann. Rpt. Ontario Agr. Coll. Expt. Farm*, 43 (1917), pp. 43-46, fig. 1).—A brief statement of progress in breeding fruits and vegetables at the Ontario Experimental Farm.

As a result of strawberry breeding work started in 1912 several thousand seedlings have been fruited. Of the selected seedlings fruiting in 1917 6 varieties appear worthy of introduction. Approximately 1,000 cross-bred seedling apple and pear trees are being grown to the fruiting age. Twelve hard apple and 100 pear seedlings grown from Russian seed of hardy varieties being fruited with the view of securing hardy fruits for the North.

Considerable progress has been made in breeding celery, cabbage, carrots, beets, and onions. Small supplies of superior stock seed of these vegetables have been raised with the view of producing future seed supplies for the Dominion.

Care of the garden in hot weather, J. W. LLOYD (*Illinois Sta. Circ.* 224 (1917, pp. 4).—This circular contains suggestions for the cultural treatment of different vegetables during hot weather.

Some tests of garden vegetables in Singapore, C. F. BAKER (*Gardens of Straits Settlements*, 2 (1918), No. 1, pp. 6-13).—Acclimatization tests of a number of varieties of vegetables conducted in the Economic Garden in Singapore are here reported.

Comparison of percentages of nitrogen in tops and roots of head lettuce plants, H. A. NOYES (*Jour. Indus. and Engin. Chem.*, 10 (1918), No. 8, pp. 6624, figs. 2).—Analyses made in a preliminary investigation of the nitrogen content of head lettuce being grown in the greenhouse at the Indiana Experiment Station are here reported. The plants were grown in bank sand containing very little available plant food, in a mixture of bank sand and partially rotted horse manure at the rate of 3 bu. of sand to 2 bu. of manure, and in heavy silt loam which produces good crops in the field.

The nitrogen content of the plants varied considerably on different soils with different fertilizer treatments on the same soil, and with the same fertilizer treatment on different soils. The soil had a greater effect on the nitrogen content of the plants (both tops and roots) than the fertilizer treatments did. The fertilizer treatments varied the nitrogen content most on the bank sand, which was lowest in plant food, and least on the bank sand and manure mixture, which was highest in plant food.

The percentage of nitrogen in the tops of the plant does not tend to bear constant relation to that in the roots. With the percentage of nitrogen in the

obtained at 100 the closest ratio obtained was 105 parts in the tops. The ratio was 236 parts in the tops.

The variations found in this preliminary study were so large that further study is being done to ascertain the optimum analyses for the head lettuce.

**Home fruit grower.** M. G. KAINS (*New York: A. T. De La Mare Co., Inc.*, 1917, pp. 215, figs. 139).—A treatise on amateur fruit growing; the successive steps of which discuss choosing varieties; beauty, comfort, and utility; laying out the plantation; home orchards in the South; buying the plants; soil, fertilizers, situations, and cover crops; summer care of plantation; dwarf fruit trees; insect and disease control; storage of fruits; the various species of nuts; diverse species of nuts; and home fruits as educators of public taste.

**Marketing berries and cherries by parcel post.** C. C. HAWKINS and C. A. HENSHLER (*U. S. Dept. Agr. Bul. 688 (1918), pp. 17, figs. 101*).—Experiments conducted by the Bureau of Markets of the U. S. Department of Agriculture in cooperation with the Post Office Department, the results of which are here presented, indicate that under proper methods of packing certain of the small fruits, such as strawberries, blackberries, huckleberries, and cherries, may be shipped by parcel post. Experiments in shipping raspberries have not been completed. The bulletin contains suggestions relative to methods of shipping small fruits. Whether such shipments will prove profitable to the grower can be determined only by consideration of various factors, such as the cost of marketing by this method and the net return as compared with other methods of marketing; the quantity of berries to be marketed, location of shipper with reference to post office and market, and the ability of the shipper to develop and maintain a mail order business.

**Better varieties of strawberries.** O. M. TAYLOR (*New York State Sta. Bul. 40 (1918), pp. 55-78, pls. 9; abridged ed., pp. 3-19*).—In continuation of a previous report (*E. S. R.*, 33, p. 142) this bulletin gives the results of tests of 100 strawberry introductions conducted on the station grounds. The varieties tested are described in detail and are also grouped according to different characteristics, such as very productive varieties, shy-plant producers, varieties susceptible to leaf spot, flowers imperfect or pistillate, very early, medium early, and very late, varieties with berries very firm, and generally desirable varieties.

As the result of breeding work conducted at the station, thousands of plants have been under observation. In the spring of 1917 plants of eight kinds that have been named were distributed in different parts of the State for testing under varying soil and climatic conditions. Full descriptions are included of these seedlings.

**Further studies of the rots of strawberry fruits.** N. E. SEYMOUR and R. B. WILCOX (*U. S. Dept. Agr. Bul. 686 (1918), pp. 14*).—In continuation of previous work (*E. S. R.*, 37, p. 351), the results are given for the season of 1917 of field investigations conducted in a number of States. In addition to a study of the strawberries in the field, experimental shipments and observations of the fruit in various markets were made. A bibliography of literature cited is appended. The results of these investigations are summarized as follows:

"Leak, caused by *Rhizopus nigricans*, is by far the most important rot of strawberries after picking. Losses from leak can be most effectively reduced by picking berries at low temperatures and by handling them carefully. Berries picked in the early morning are cool and less likely to decay than those picked during the heat of the day. Adequate refrigeration greatly reduces the growth of *R. nigricans* in transit. Washing strawberries to remove dirt

may have a beneficial effect if the berries are washed in clean water, packed with care, packed in the crates while still wet, and refrigeration is not delayed. Less bruising results if the berries are packed in boxes and washed by dipping the entire box or by running water through it. The berries are washed before packing and plating.

"*Botrytis* sp. is characteristically a field rot of strawberries. It is abundant and serious in the field under conditions of excessive moisture. Berries affected with *Botrytis* can be recognized at the time of picking and should not be included in fruit intended for market. Although it is able to grow at low temperatures and frequently produces abundant mycelium and hyphae on strawberries in refrigerator cars, its growth on ripe berries is so slow that it is of minor importance as a cause of rot in transit. It is noted that the entrance of *Rhizopus* into strawberries and the production of rot are not dependent upon previous infection by *Botrytis*."

**Influence of the annual shoot pruning on the vitality of the plant.** *Compt. Rend. Acad. Agr. France*, 4 (1918), No. 28, pp. 785-804, figs. 4, 5. Observations made by the author indicate that green shoots of the grapevines are removed for forage purposes in the fall after the starch has migrated from the canes and roots but before the leaves have become discolored without actually injuring the vitality of the vines.

**Results obtained in Italy from the sowing of caprifig seed.** *R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5, ser., 27 (1918), 1, Vol. 55-57; *abs. in Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract.*, 9 (1918), No. 5, p. 571.—The author cites the experience of other investigators in which it was found that when seeds of the common edible fig are sown, edible figs and caprifigs are obtained. In 1912 he sowed both wild and cultivated caprifig seed. The plants obtained began to bear fruit in 1917 and were to be partly edible figs and partly caprifigs. Thus it appears that the seeds of the caprifig, like those of the common edible fig, give both edible and caprifigs.

**Diseases and pests of cacao in Ecuador and modern methods adapted to the cultivation of cacao.** J. B. ROMA: (*Enfermedades y Plagas del Cacao en Ecuador y Metodos Modernos Apropriados al Cultivo del Cacao, Guayaquil, Ecuador*: [Author], 1918, pp. 80, figs. 22).—An account of the important diseases and pests of cacao in Ecuador, including a discussion of the adaptation of new practices in the cultivation of cacao, translated from English by A. Padellaro.

**[The oil content of coconuts on heavy clay soil].** J. B. HARRISON and C. W. ANDERSON (*Rpt. Dept. Sci. and Agr. Brit. Guiana*, 1916, pp. 44, 45).—Analysis of coconuts growing on heavy clay soil in the experimental fields of the Department of Science and Agriculture are reported. The data given show that the oil content of the nuts compares favorably with the oil content of coconuts grown in various other countries.

**Some effects of shading lemon trees.** A. D. SHAMEL, C. S. POMEROY, C. D. DYER, and L. B. SCOTT (*Mo. Bul. Cal. Com. Hort.*, 7 (1918), No. 7, pp. 17, figs. 4).—In November, 1913, a tent of tobacco cloth, approximately an acre in extent, was erected over a plat of 76 Eureka lemon trees in an orchard at Corona, Cal., for the purpose of determining its value as a protection from frost. No serious frosts occurred prior to the destruction of the tent in December, 1915, but a large amount of data showing the effect of shading the trees was secured and is here presented in part.

Wind velocity, temperature, and relative humidity records were maintained throughout the period of observation. Wind velocity was materially reduced within the tent thereby protecting the trees and fruit from injuries such as broken branches, scarred and bruised fruits, and wilted leaves during periods of low relative humidity. The temperature records indicate that for the ed-

and it was slightly warmer inside the tent than outside. If the outside temperature remained constant for a few hours the inside temperature soon reached the same point, while if the outside temperature dropped quickly and rose again in a short time the difference between the two minima was from 4 to 7° F. For the whole period the relative humidity outside the tent was slightly higher than inside. This is accounted for in part by the occurrence of tropical early morning fogs in the region of the studies which may not have readily penetrated the tent, and in part by the somewhat higher average temperature, 127° inside the tent.

Soil samples to a depth of 6 ft. were taken at intervals from December, 1913, to October, 1914, usually just before the regular orchard irrigation. The average moisture content of the first 3 ft. of soil inside the tent was higher than that of the comparative soil area outside. In the lower 3 ft. the soil moisture was practically the same inside the tent as outside.

Individual yield records were kept of a number of trees included in the shaded area before the tent was erected. These data, together with data secured on yields after the tent was erected, indicate that shading did not materially increase the total production per tree but did result in a higher proportion of green fruits by the trees inside the tent as compared with those outside. Another effect of shading the trees was to develop a larger proportion of the crop during the winter and fall periods as compared with their production during the spring and summer period than was the case with the trees in the unshaded plot. It is pointed out that lemons are usually sold for higher prices in the spring and summer months than during the winter months.

**A maturity standard for citrus fruits, F. LÓPEZ** (*Rev. Agr. Puerto Rico, 4* (1914), No. 3, pp. 101-108).—The results are given of a study of changes taking place in grapefruit before and after maturity. The study, which was started by W. B. Cady in 1915 and continued by the author, was conducted with special reference to determining the proper time to pick grapefruit for shipment in order to comply with the Federal law relative to the ratio of sugar to acid.

Analyses made show that such varieties as Marsh Seedless and Duncan will not come to a proper state of maturity in Porto Rico until after November 15, whereas the Triumph sometimes matures in September and sometimes earlier. Practically the entire percentage of acid is formed by the commencement of maturity, although in some varieties small quantities of acid are formed after maturity.

The percentage of acid decreases gradually as the fruit matures. The total sugar content increases until the fruit reaches maturity, after which it is practically constant. The proportion of invert sugar to sucrose is constant until the fruit matures, after which the invert sugar increases and the sucrose diminishes. The solids in solution increase continually as the season progresses.

The only change of importance after the fruit is removed from the tree and during the curing process is the inversion of the sucrose.

**The theory and practice of sanitary precautions in grove and packing house operations, J. C. HOLTON** (*Quart. Bul. Plant Bd. Fla., 2* (1918), No. 4, pp. 21-179).—This paper discusses the methods of preventing decay and loss of citrus fruit during the processes of picking, handling, and packing.

**Growing medicinal plants in America, A. S. CUSHMAN** (*Jour. Franklin Inst., 185* (1918), No. 3, pp. 267-278, figs. 8).—A paper on this subject presented at the meeting of the Franklin Institute, April 17, 1918, in which the author describes some of the conditions and difficulties encountered in the attempt to develop the culture of medicinal plants in America.

Sequence of the first blooming of the rose collection, spring of 1918. MARGARET V. SEXTON (*Jour. N. Y. Bot. Gard.*, 19 (1918), No. 223, pp. 149-156).—This comprises a record of the first flowering of 359 kinds of bush roses in the rose garden of the New York Botanical Garden. The record was started primarily for comparison during subsequent years.

The small place: Its landscape architecture, ELSA REHMANN (Yale Univ. G. P. Putnam's Sons, 1918, pp. XXII+164, pls. 96).—With the view of pointing out the fundamentals that underlie the planning and planting of the small place, the author here discusses in detail 15 problems in landscape architecture that have been worked out by various landscape architects.

### FORESTRY.

Miscellaneous conifers of the Rocky Mountain region, G. B. SCHWORTH (U. S. Dept. Agr. Bul. 680 (1918), pp. 44, pls. 22).—This bulletin deals with the distinguishing characteristics, forest habits, and geographic distribution of spruce, larch, hemlock, false hemlock, incense cedar, arborvitae, and yew trees that grow naturally within the Rocky Mountain region. Keys for the identification of genera and species are included.

Utilization of elm, W. D. BRUSH (U. S. Dept. Agr. Bul. 683 (1918), pp. 44, figs. 8).—An account of the commercial species of elm with reference to their characteristics and structure of elm wood, supply and consumption, utilization by various industries, grading rules for elm, lumber and stumpage values, markets, elm in the woodlot, and classified uses of elm in different wood-using industries.

An investigation of the growth in natural second-growth teak woods in north Japara, H. BEEKMAN (*Dept. Landb., Nijr. en Handel [Dutch East India] Meded. Proefstat. Boschv.*, No. 2 (1917), pp. 1-39, pl. 1).—A study of growth and accretion in natural regenerated teak woods, based upon measurements of 57 sample trees which are presented in tabular form and discussed.

[Report on ornamental and economic trees], C. K. BANCROFT (*Rpt. Dept. Agr. and Agr. Brit. Guyana*, 1916, pp. 53-55).—A list is given of important ornamental and economic trees other than palms that flowered at the Botanic Garden, Georgetown, Demerara, in 1916, including the months of flowering.

Woodlot improvement and the production of firewood, A. E. TAYLOR (*Bul. Ohio Sta.*, 3 (1918), No. 7, pp. 215-221, figs. 3).—This paper contains practical suggestions for improving the farm woodlot, with special reference to the utilization of wood removed in improvement work as firewood.

Farm forestry in Virginia, R. C. JONES (*Va. Geol. Com., Off. State Forester Bul.* 12 (1917), pp. 69).—This bulletin points out the value of woodlands on the farm; describes the important native trees of Virginia; and discusses the essentials of good farm woodlands, improvement of farm woodlands by plantings, harvesting of mature trees on farm woodlands, starting new trees on farm woodlands, and protection of farm woodlands. The bulletin concludes with a partial list of publications for reference.

The forests of Alexandria County, Va., W. B. DUNWOODY (*Va. Geol. Com., Off. State Forester Bul.* 13 (1917), pp. 18, pl. 1).—This embraces the results of a survey of the forests of Alexandria County, Va., and discusses the characteristics, products, and proper management of the forests.

The forests of Nottoway County, Va., G. D. MARCKWORTH (*Va. Geol. Com., Off. State Forester Bul.* 14 (1917), pp. 8).—A survey similar to the above of the forests and forest products of Nottoway County, Va.

The forests of Chesterfield County, Va., G. D. MARCKWORTH (*Va. Geol. Com., Off. State Forester Bul.* 15 (1917), pp. 8).—A survey similar to the above of the forests and forest products of Chesterfield County, Va.

Report of the State firewarden, C. P. WILDER (*Ann. Rpt. Forest Dept. and Geol. N. J.*, 1917, pp. 103-135, pls. 2, figs. 21).—A review of the forest fire season, including a record of forest fires for the year ended November 1, 1917.

Forest fires in Canada, 1914, 1915, and 1916. T. W. DOWDALL (*Rept. Inst. Canada, Forestry Branch Bul. 64* (1918), pp. 45, figs. 17).—A statistical account of the forest fires in various parts of the country during the three seasons, 1914-1916.

Forest legislation in Canada, 1917-18 (*Canad. Forestry Inst., 14 (Forest), No. 7*, pp. 1791-1793).—A résumé of public measures in the Provinces and in the Dominion.

Forestry in Sweden, J. A. AMILON (*Internat. Inst. Agr. [Geneva], Internat. Agr. Sci. and Pract. Agr.*, 8 (1917), No. 11, pp. 1979-1991).—An account of forestry in Sweden, presented under the headings of area and value of the forests, forest regions, forest administration, management of the forests, forest products, forest laws, and forestry research and instruction.

Annual progress report of forest administration in the United Provinces for the forest year 1916-17, P. H. CLUTTERBUCK (*Ann. Rpt. Forest Admin. United Prov. India, 1917*, pp. [6]+45+LXX+71).—The usual progress report relative to the constitution, management, and administration of the State forests of the United Provinces, including a financial statement for the forest year 1916-17.

All important data relative to forest areas, forest surveys, working plans, forest protection, miscellaneous work, yields in major and minor forest products, revenues, expenditures, etc., are appended in tabular form.

Report on the forest administration of the Central Provinces for the year 1916-17, M. HILL (*Rpt. Forest Admin. Central Prov. [India], 1917*, pp. 5+11+16).—A report similar to the above relative to the administration of the State forests of the Northern, Southern, and Berar Circles of the Central Provinces for the year 1916-17.

Report on forest administration in the Andamans for the year 1916-17, E. H. CAVENDISH (*Rpt. Forest Admin. Andamans, 1917*, pp. 161+33).—A report similar to the above relative to the administration of the State forests of the Andamans for the year 1916-17.

Annual report on the forest administration in Ajmer-Merwara for the year 1916-17, SAMBHOO DATT JOSHER (*Ann. Rpt. Forest Admin. Ajmer-Merwara, 1917*, pp. 26).—The usual annual report (E. S. R., 37, p. 146).

## DISEASES OF PLANTS.

A list of plant diseases of economic importance in Indiana, with bibliography, F. J. PIPAL (*Proc. Ind. Acad. Sci.*, 1915, pp. 379-413).—This list and bibliography of plant diseases in Indiana is said to be intended merely as a foundation for future plant-disease surveys. With a few exceptions, the list includes all plant diseases reported in previous publications, and other diseases of which specimens have been obtained. The distribution of the diseases is usually given according to counties or to the sections of the State in which they are prevalent, or as general over the State. The diseases with their causal organisms are listed under the several hosts.

Additions to the list of plant diseases of economic importance in Indiana, G. A. OSYER (*Proc. Ind. Acad. Sci.*, 1916, pp. 327-332).—This list, which is said to be supplementary to that of Pipal given above, represents collections made recently by the author and others. It is intended to add to the list from time to time until a fairly complete survey of Indiana has been made.

Work connected with insect and fungus pests and their control (*Ann. Rpt. Agr. West Indies, Rpt. Agr. Dept. Montserrat, 1916-17*, pp. 26-29).—The above report on insect pests and their control, an account is given of the third year's experiments in spraying peanuts for the rust fungus (*Uredo arachidis*). This work has led to a modification of the conclusion that the fungus can be controlled properly by two applications of Bordeaux mixture, although better results followed its use in all cases.

A wilt of alfalfa is noted as commonly associated with the presence of *Fusarium*.

Recent developments in spraying, J. H. CARMODY (*Ann. Rpt. State Hort. Soc. Mich.*, 46 (1916), pp. 85-100).—Discussion is noted regarding various sprays in liquid or dust form and of their employment against fungi injurious to fruit-producing interests.

Comparative efficiency of basic and acid copper sprays, J. CAPES (*Compt. Rend. Acad. Agr. France*, 4 (1918), No. 2, pp. 86-90).—It is stated that Bordeaux or Burgundy mixture is completely efficacious at the moment of its application and that it remains so for some time, a 2 per cent strength of the acid form giving equally good results for both, but the efficiency of either at this strength is more rapidly lost than is that of an alkaline mixture. Acid sprays also leave larger areas of the leaf surface open to attack than do basic sprays.

A new formula for Bordeaux, G. E. SANDERS (*Canad. Hort.*, 41 (1918), No. 5, p. 122).—The author gives a brief account of the successful employment of a Bordeaux mixture made up of 2 lbs. copper sulphate and 10 lbs. lime to 40 gal. water, prepared according to a method which is said to require the handling of dry materials only and also to economize time and labor.

Dusting v. spraying in Nova Scotia, P. A. MURPHY (*Canad. Hort.*, 41 (1918), No. 5, pp. 113, 114, fig. 1).—The somewhat conflicting results obtained up to the time of this statement are held to indicate the necessity of experimenting throughout a number of years before deciding as to the general advantage to be derived from the dust applications as a means of controlling apple scab. Data are detailed as obtained from comparative tests of dusts of various strengths, of lime-sulphur, and of a combination of lime-sulphur and Bordeaux mixture. The extent to which scab will develop in spite of the dust depends upon the season. In all but very severe outbreaks dusting seems to be effective in the United States.

Dusting experiments in 1917, V. B. STEWART (*Phytopathology*, 8 (1918), No. 2, pp. 63, 64).—In a previous publication (*E. S. R.*, 36, p. 750), the author gave an account of the successful use of finely ground sulphur and powdered lead arsenate for controlling leaf diseases of nursery stock. In 1917 the experiments were repeated, the amount of lead arsenate being reduced in one case to 5 per cent, and in another case 10 per cent hydrated lime was substituted for the lead arsenate in order to reduce the cost of the mixture.

From the results obtained in undertaking the control of *Fabrea maculata* on quince and leaf blotch of horse-chestnut trees due to *Guignardia asculi* it appears that a reduction to 5 per cent in the amount of lead arsenate did not decrease the effectiveness of the mixture. The substitution of hydrated lime for the lead arsenate, however, reduced considerably the fungicidal value of the mixture.

Dusting as means of disease and insect control, J. F. SHELDON (*Ann. Rpt. State Hort. Soc. Mich.*, 46 (1916), pp. 42, 43).—The advantages claimed for the dust method are briefly noted.

*Cronartium coleosporioides* on *Pedicularis groenlandica*, J. R. WEIR and E. E. HUBERT (*Phytopathology*, 8 (1918), No. 2, p. 63).—The occurrence of *C. coleosporioides* on the above host is reported. In addition, it is stated that it has

been collected on *Orthocarpus luteus* and *O. purpureo albicus*, this rust being now known to occur on three genera, namely, *Castilleja*, *Orthocarpus*, and *Pedleya*.

The mosaic disease of *Phytolacca decandra*, H. A. ALLARD (*Phytopathol. rep.*, 1918), No. 2, pp. 51-54, figs. 2).—Attention has been previously called to a mosaic disease of the pokeweed which resembles in some respect the mosaic disease of tobacco (E. S. R., 14, p. 264). An investigation was made of the mosaic disease of pokeweed plants, and a series of tobacco plants was inoculated with the virus from pokeweed without the production of any evidence of disease.

In a study of means by which the disease might be transmitted, healthy and mosaic-diseased pokeweed and tobacco plants were grown side by side, and although aphids were active in the spread of the mosaic disease of tobacco to susceptible solanaceous plants, in no instance did the mosaic disease of pokeweed make its appearance in healthy plants until inoculated with a needle. This indicates that insects capable of acting as carriers of the infective principle were not present in the greenhouse during the time of the experiment.

Two new species of *Pestalotzia* in Tuscany, M. SAVILLI (*Riv. Sci. Bot. Ital.*, 1917), pp. 62-68, figs. 8; abs. in *Internat. Inst. Agr. (Rome)*, *Internat. Rev. Sci. and Pract. Agr.*, 8 (1917), No. 9, p. 1322).—The author reports a study of a fruit disease of *Feijoa sellowiana* in the Florence Botanical Garden in the winter of 1914-15 and a leaf spot of *Quercus ilex agrifolia* near Marina di Pisa in the spring of 1917. The fungi noted as apparently causal were considered to be new species and were named respectively *P. feijoi* and *P. ilici*.

Rusts of Hamilton and Marion Counties, Indiana, G. W. WILSON (*Proc. Ind. Acad. Sci.*, 1916, pp. 382, 383).—Five species are briefly noted, economic interest attaching to *Colosporium campanula* on *Campanula americana*, *Dicoma phlei-pratense* on *Phleum pratense*, and *D. calvacearum* on *Althaea rosea*.

Field conference of cereal pathologists, C. W. HENDERSON (*Science*, n. ser., 1918), No. 1232, pp. 148-150).—A summary account is given of papers and discussions presented at the fourth annual conference of cereal pathologists, held at Purdue University, Lafayette, Ind., June 19 to 21, 1918.

The effect of hydrogen peroxid in preventing the smut of wheat and oats, F. J. FURAL (*Proc. Ind. Acad. Sci.*, 1916, pp. 378-381).—In tests following up those reported previously (E. S. R., 36, p. 542), the author found that hydrogen peroxid, while harmless and rather stimulating as regards germination when applied to seed wheat and oats, was ineffective as regards freeing the seed of smut infection except when applied at concentrations which are practically prohibited by the expense of the treatment. Formaldehyde is said to be more effective and also to be the cheapest of disinfectants for seed grain.

Longevity of *Helminthosporium teres*, A. L. BAKKE (Abs. in *Phytopathol. rep.*, 8 (1918), No. 2, p. 80).—The resistance of spores of *H. teres* to unfavorable conditions was shown in an experiment in which portions of barley stems and leaves were sterilized and afterwards inoculated with spores on January 9, 1911. The tubes were examined and transfers made November 7, 1917. Visible growth and pigmentation resulted in 24 hours in case of transfer of conidia, and evidence of growth in less than 5 days from pycnosporos.

A means of controlling stalk disease of wheat, HERBERT and H. DEVAUX (*Compt. Rend. Acad. Agr. France*, 3 (1917), No. 35, pp. 992-997).—Having noted the tendency of certain strains of wheat to throw out adventitious roots above the region of the stalk attacked by stalk disease fungi, and having tested the effects of killing up the stalks, the author reports that this plan appears to offer means of decreasing loss from stalk disease, especially if stocks favorable to the treatment be selected. Discussion of the plan is also noted.



Can biologic forms of stem rust on wheat change rapidly enough to interfere with breeding for rust resistance? E. C. STARKMAN, J. H. PARKER, and F. J. PIEMEISEL (*Jour. Agr. Research [U. S.]*, 14 (1918), No. 2, pp. 111-124, figs. 5).—The results of cooperative investigations carried on by the Minnesota Experiment Station and the Bureau of Plant Industry, U. S. Department of Agriculture, are given, in which a study was made of the possibility of breeding cereals permanently resistant to rust.

From field observations and from experimental work done in the field largely it is considered that rust resistance is comparable with other permanent characters and that it is not primarily controlled by seasonal conditions, soil type, geographical location, or other cultural conditions. It is considered rather an hereditary character which can not be produced by the accumulation of fluctuating variations within a susceptible line nor broken down by changes in the host or parasite. It is believed that resistance of wheat varieties may vary in different regions because of the presence of different biologic forms of rust.

The authors believe that there is little basis for the conclusion previously expressed by Evans (*E. S. R.*, 25, p. 453) that hybrids between resistant and susceptible varieties will exert a harmful final effect by increasing the virulence and host range of stem rust.

An acium on red clover (*Trifolium pratense*), G. N. HOFFER (*Proc. Ent. Acad. Sci.*, 1916, pp. 325, 326).—The author reports having found what he believes to have been acia of *Uromyces fallens* on the stems and leaves of red clover.

Celery blight and its prevention, J. E. HOWITT (*Canad. Hort.*, 41 (1914), No. 5, p. 117).—The results of experiments during five years are said to show that late blight of celery can be controlled by spraying with 4:4:40 Bordeaux mixture, commencing when the plants are in the seed bed and continuing at intervals of a week or ten days, or even twice a week, if necessary. It is claimed that this can be continued until within two or three days of the time when the celery is to be harvested, as the subsequent washing removes the fungicide. Sulficide and lime-sulphur are not recommended.

Brown rot of Solanaceæ on Ricinus, E. F. SMITH and G. H. GODFREY (*Solanaceæ n. ser.*, 48 (1918), No. 1228, pp. 42, 43).—The authors report the occurrence of a wilt of castor beans due to *Bacterium solanacearum*. The organism isolated from the castor bean is said to behave in various media like *B. solanacearum* from other hosts, and inoculations made on tomato and tobacco produced typical wilts of these plants. As the castor bean has been found subject to this wilt the authors suggest that this crop should not be planted on land where bacterial wilt of solanaceous plants has recently occurred.

True nature of spinach blight and relation of insects to its transmission, J. A. MCCLINTOCK and L. B. SMITH (*Jour. Agr. Research [U. S.]*, 14 (1918), No. 1, pp. 1-60, pls. 12, fig. 1; abs. in *Phytopathology*, 8 (1918), No. 2, p. 74).—A preliminary report is given of investigations conducted at the Virginia Truck Experiment Station on the nature of spinach blight, its dissemination, and transmission by insects.

Spinach blight is said to be a specific disease characterized by a mottling and malformation of the leaves and a decided stunting of the growth. Diseased plants go through a number of characteristic stages and finally die. This blight may be distinguished from fungus diseases by the fact that no specific organism is known to cause it, and also that various fungi produce definite leaf spots while the blight produces gradual degeneration of the tissues.

Inoculation experiments have shown that the disease is of an infectious nature and it is apparently largely transmitted by insects. Under the conditions

in which spinach is grown in eastern Virginia, a number of species of aphids are present, the most abundant being the potato aphids (*Macrosiphum euphrati*) and the spinach aphids (*Rhopalosiphum persici*). The potato aphids are the more important agent in disseminating the disease, and experiments with them have shown that the aphids carry the virus causing the disease and that the infectious entity may be transmitted by adult aphids to their offspring. It has been found that the causal factor of the disease may be hereditary in aphids, the authors believe that the cause of the blight possibly survives in the soil. So far as experiments have gone, there is no indication that spinach blight is transmitted by seed or through the soil.

Control of aphids infesting spinach is said to offer the most immediate remedy of controlling spinach blight. Experiments in the breeding of blight-resistant spinach are in progress.

**Diseases of sugar cane and its control.** J. GREENWALD (*Arch. Suikerindus. Nederland, Indië*, 25 (1917), No. 16, pp. 597-638, pls. 3; *Meded. Proefstat. Java-Suikerindus., Landbouwk. Ser.*, No. 6, (1917), pp. 42, pls. 9). In a continuation of the studies previously reported (*E. S. R.*, 33, p. 851), the author states that the disease of sugar cane is pretty generally distributed over the island of Java. Some sugar cane varieties appear to be immune to the disease, which is attributed to *Phaenocarpa vasculorum*. Outbreaks are related to the presence of soft, easily rotting plant materials in the soil. These may produce a root injury and thus constitute a factor predisposing to the disease, as well as a hindering factor to the development of the plant. The infection is less severe during the western monsoon than the eastern monsoon and less so on heavy than on light soils. The presence of the organism in the soil is not sufficient to cause the disease in the absence of other factors. The trouble can be successfully opposed by the addition of the soil of slowly rotting material or by the use of carefully regulated amounts of the easily rotting vegetable materials.

The plant cane supply in the Java sugar industry in relation to sereh, P. VAN HAGENVELD (*Arch. Suikerindus. Nederland, Indië*, 25 (1917), No. 15, pp. 557-564; *Meded. Proefstat. Java-Suikerindus., Landbouwk. Ser.*, No. 5 (1917), pp. 1-10).

Sereh, or sieve tube disease, of sugar cane is an important determining factor in the demand for the importation of plant cane into Java. Each locality is subject to conditions determining the importance of the disease in that locality. Difficulties are discussed, as are cooperative and other plans proposed to obtain an adequate cane supply.

**Diseases of tobacco plants:** Blue mold and a bacterial disease. G. P. DARRINGTON (*Agr. Gaz. N. S. Wales*, 29 (1918), No. 2, pp. 82-88, figs. 3).—A brief description of blue mold (*Peronospora hyoscyami*) is given. *Bacillus solanacearum* is thought to be the causal organism in several diseases to which local names are given. *Phytophthora nicotianae* is mentioned as being among the soil-borne molds. *B. nicotianae* causes a stem rot.

**Fire blight of fruit trees.** J. T. BREGGER (*Ann. Rpt. State Hort. Soc. Mich.*, 1916, pp. 40, 41).—Suggestions regarding protection against fire blight of fruit trees include not only removal of diseased branches but also pruning methods designed to lessen the likelihood of infection when the disease is present on a given tree and to utilize the disinfecting properties of sunlight by admitting light to the interior of the tree.

The sources of apple bitter rot infections. J. W. ROBERTS (*U. S. Dept. Agr. Bul.* 654 (1918), pp. 26, pls. 5).—Results are given of a study of the apple bitter rot due to *Glomerella cingulata*, which is said to occur in nearly all sections of the world where apples are grown but which reaches its high point of destructiveness in the southern apple-growing regions of the United States. Spore dissemination is said to be carried on by such agencies as rain, dew, insects, and

possibly birds, wind being a negligible factor. Different varieties of apples are found to vary greatly in susceptibility to the disease. The causal organism has been found to survive the winter in mummies, bitter rot cankers, and cankers other than those of bitter rot. During the current season, the causal organism may be found on the leaves and infected fruit. Conidia on the latter are said to be the principal means by which the disease is spread after the initial infection. In addition to the apple, many other plants are subject to the disease.

For control of bitter rot, the author recommends removal of mummies and cankers supplemented by spraying. This treatment is said to have given better results in orchards where in previous years spraying alone was unsuccessful.

**Apple scab and its control.** H. H. WHETZEL (*Canad. Hort.*, 41 (1918), No. 5, p. 121).—Summarizing the results of experimentation, the author states that during the last two seasons, which were very favorable to apple scab, it has been shown conclusively that dusting is as effective as spraying in the control of this disease. The work has demonstrated also the impossibility of preventing the primary infection, especially in rainy seasons.

**Combating cherry leaf blight.** H. H. WHETZEL (*Canad. Hort.*, 41 (1918), No. 5, pp. 117, 118).—In case of sweet cherry, lime-sulphur or sulphur dust applied just after the petals fall, again ten days or two weeks later, and a third time just after the fruit is gathered is said to give clean foliage throughout the average season. Sour cherry may be kept clean by employing 1:50 lime-sulphur 5:5:50 Bordeaux mixture, or a dust application made up of 90 per cent fine ground sulphur and 10 per cent lead arsenate.

**The bacterial shot-hole of peach.** H. W. ANDERSON (*Trans. Ill. Hort. Soc. ser.*, 51 (1917), pp. 121-128).—To data taken from reports by Rolfs (*E. S. R.*, 34, p. 248) and by Roberts (*E. S. R.*, 37, p. 842), the author adds an account of his own observations. This disease, first described as occurring in the United States about 10 years ago, is still thought to be confined within its borders. The regular sprays used for the control of other peach diseases are not effective in connection with this trouble, but it is said that the employment of nitrogenous fertilizers greatly reduces loss from this cause.

**A nonparasitic malady of the vine.** F. E. GLADWIN (*New York State Sta. Bul.*, 449 (1918), pp. 99-110, pls. 3).—For a number of years, observations have been conducted on a disease of grapevines first observed in 1910. Vines affected with the trouble first show a streaked pallidness of the leaves in the lower vascular spaces, these areas later becoming yellow. Isolated areas of the leaf blade deaden, and when these join, a considerable portion of the leaf tissue becomes functionless. As a result of the injury to the foliage, the growth is materially checked and the wood usually fails to mature well. The fruit does not color nor is the normal amount of sugar fixed, and shelling may result.

The affection manifests itself on light soils during drought and on heavy impervious soils when excessively wet. Soils deficient in organic matter contribute to the trouble.

Experiments with fertilizers failed to show any reduction in the amount of injury, but the incorporation of considerable organic matter in the soil is thought to be a possible corrective. Draining the heavy types of soil is also considered advantageous. Early spring plowing and frequent summer tillage are recommended, and affected vines should be more closely pruned than normal ones.

**Nut fall and leaf droop of coconuts.** T. PETCH (*Dept. Agr. Ceylon Leaflet*, (1917), pp. 2, pl. 1).—It is stated that after the heavy and unseasonable rains of January and February, 1917, an extensive fall of nearly mature coconuts occurred on some estates in the district lying between Galagedara and Kurumb.

25. The stalk end of the nut showed discoloration, which in some cases covered the whole of the stalk end and spread half-way to the point, showing generally a somewhat sodden appearance. The cause of the decay is said to be a *Phytophthora*. The fungus may attack the fruit stalk and cause the nuts to drop without being actually attacked.

26. From the same area, a drooping of the leaves which form the lower part of the crown is described. It is thought that this is only a different manifestation of the activity of the *Phytophthora* which causes the fall of the nuts.

27. Goes upon a market disease of limes, O. T. WILSON (*Phytopathology*, 8 (1918), No. 2, pp. 45-50, fig. 5).—A description is given of a disease of limes designated by the author during the winter of 1916-17. The disease is said to have been very common on this fruit in the markets of Cincinnati, almost any fruit examined yielding some diseased specimens. The trouble was found to be due to a fungus which grows readily on a variety of media, but no spores have been found, and until such are produced the status of the causal organism is left in doubt.

28. Diseases injurious to the pecan, J. MATZ (*Florida Sta. Bul.* 147 (1918), pp. 1-119, figs. 15).—Descriptions and suggestions for control, so far as definite causes are known, are given for the following diseases of pecan: Scab (*Fusicladium effusum*), anthracnose (*Glomerella cingulata*), mildew (*Microsphaera* sp.), rosette, die-back (*Botryosphaeria berengeriana*), pink mold (*Cephalosporium* sp.), kernel spot, brown leaf spot (*Cercospora fusca*), nursery blight (*Phosticta carya*), and leaf blotch (*Gnomonia* sp.). In addition, brief descriptions are given of winter injury and injury due to salamanders and scoldes.

29. The causes of silver leaf, L. PETRI (*Ann. R. Ist. Sup. Foreste Naz. Firenze*, 2 (1916-17), pp. 465-475, pl. 1, figs. 2; *abs. in Internat. Inst. Agri. [Rome], Internat. Rev. Sci. and Pract. Agr.*, 8 (1917), No. 8, pp. 1196, 1197).—The author maintains that besides *Stereum purpureum*, claimed by GISSOW (E. S. R., 28, 1918) to cause silver leaf of various trees, other conditions may give the same effect. Among the conditions effective in this way are mentioned the presence of calcium oxalate crystals in the subepidermal and intercellular spaces and the separation of the cuticle from the palisade cells. It is thought that underlying these changes and also involved in the parasitic form of the disease is a process of hydrolysis of the pectic substances of the walls of the epidermal cells. This is thought to be due to the action of a pectinase, the formation of which depends upon external influences.

30. Notes on the overwintering of forest tree rusts, J. R. WEIR and E. E. HUBERT (*Phytopathology*, 8 (1918), No. 2, pp. 55-59).—Data are presented which indicate that *Melampsora bigelovicii* on willows, *Melampsoropsis pyrolæ* on *Pyrolas*, *Melampsora* sp. on *Epilobium adenocaulon*, *Melampsoridium betulæ* on birch, and *Pucciniastrum pyrolæ* on *Pyrolas* winter over by means of the unidial conidia. The *Pucciniastrum* sp. on *E. adenocaulon* is said to resemble very closely *P. epilobii* of Europe in its habit of wintering over.

31. The acidifying action of *Coniophora cerebella*, L. PETRI (*Ann. R. Ist. Sup. Foreste Naz. Firenze*, 2 (1916-17), pp. 433-447, figs. 2).—The study of *C. cerebella* in relation with pine, beech, and oak during eight months is said to have demonstrated an acidifying action of this fungus on these woods. The action is said to be due to oxalic acid. Apparently superficial growth without penetration of the constituents of the cell walls does not lead to increase of acidity but a continual oxidation, particularly of tannic acid in connection with this action, leads to a diminution of acidity. Either increase or decrease of acidity may appear in connection with the activity of *Merulius lacrymans*.

**New hosts for *Razoumofskyia laricis*, J. R. WEIR** (*Phytopathology*, 8 (1918), No. 2, pp. 62, 63).—This dwarf mistletoe, in addition to being abundant on *Pinus contorta*, is said to have been collected on *Pinus contorta*, *P. albicaulis*, *Picea engelmannii*, and *Abies lasiocarpa*. *R. douglasii* was common on *Pseudotsuga laricina* and was also collected on *Picea engelmannii* and *A. grandis*. *R. americana*, a common mistletoe of *Pinus contorta*, was also found on *P. ponderosa*.

**Black canker of chestnut, L. PETRI** (*Ann. R. Ist. Sup. Foreste Naz. Italia*, 2 (1916-17), pp. 215-360, pls. 3, figs. 31).—An extended study has been made of the chestnut disease previously noted (E. S. R., 37, pp. 657, 658), and is now reported on in considerable detail.

The specific infection producing ink disease, or black canker, of chestnut is localized in the cambium of the basal portions of the larger roots and the trunk. It is normally a pluricellular parasitic fungus which may remain undetected during a greater or lesser portion of its existence. Reproductive bodies have not yet been recognized. In the cambium it forms haustoria, which may be globose or filamentous.

Infection occurs usually by contact of sound with diseased material, and the disease is propagated rapidly, the death of the tree following the decay of the cambium. The infection is soon complicated by the extension of other fungi into the region in question, and is easily confused therewith.

Among the predisposing conditions mentioned are impermeability of soil and preponderance of clay. Apparently, *Polyporus sulphureus* is also a predisposing factor. *Coryneum peractiosum* apparently meets very favorable conditions in the infected region, but this is only a sort of complementary factor, and the same is probably true of *Endothia radialis*. The only remedies suggested are destruction of the diseased material and isolation of the unaffected.

**Study of the morphology and biology of *Blepharospora cambivora*, parasitic on chestnut, L. PETRI** (*Atti R. Accad. Lincei, Rend., Cl. Sci. Fis., Mat. Nat.*, 5, ser., 26 (1917), II, No. 11, pp. 297-299).—Further studies (see above) are claimed to have shown that black canker of chestnut is due primarily to the specific parasite (which has been designated *B. cambivora* n. sp.) attacking and destroying the cambium.

**The parasite causing black canker of chestnut, L. PETRI** (*Alpe Italia*, 1, ser., 5 (1918), No. 1-2, pp. 1-7).—Against the effects of black canker of chestnut destruction of the trees is thought to be the chief if not the only remedy presently available.

**Rhizoctonia as a needle fungus, C. HARTLEY** (*Phytopathology*, 8 (1918), No. 2, p. 62).—The author reports observing *Rhizoctonia* on one-year-old Douglas fir seedlings in a forest nursery in Utah.

**White pine blister rust [in Maine], C. L. WILKINS** (*Agr. of Maine*, 1916, pp. 43-47).—White pine blister rust is said to have been shown by a brief survey which is outlined, to exist in greater or less abundance in almost every pine growing area in Maine. A brief account in popular form is given of the history, appearance, and treatment of this disease, which is declared to be a serious menace to the timber interests of Maine.

**White pine blister rust, S. H. EATON** (*Agr. of Maine*, 1916, pp. 78, 79).—Discussing the information noted above, the author emphasizes the danger from the spread of white-pine blister rust on pine and on its alternate host, currant or gooseberry.

## ECONOMIC ZOOLOGY—ENTOMOLOGY.

**Fresh water biology, H. B. WARD and G. C. WHIPPLE** (*New York: John Wiley & Sons, Inc.*, 1918, pp. IX+1111, figs. 1547).—In the preparation of this work

first few chapters of which are devoted to a discussion of general biological matters, the authors were aided by a staff of specialists. Following an introduction by the senior author, the subject is dealt with as follows: Conditions of existence, by V. E. Shelford (pp. 21-69); Methods of Collecting and Photographing, by J. Reighard (pp. 61-89); Bacteria, by E. O. Jordan (pp. 90-99); Green Algae (Cyanophyceae), by E. W. Olive (pp. 100-114); The Fresh-water Algae, Excluding the Blue-green Algae, by Julia W. Snow (pp. 115-177); Larger Aquatic Vegetation, by R. H. Pond (pp. 178-209); Amoeboid Protozoa (Sarcodina), by C. H. Edmondson (pp. 210-237); Flagellate and Ciliate Protozoa (Mastigophora and Infusoria), by H. W. Conn and C. H. Edmondson (pp. 238-300); The Sponges (Porifera), by E. Potts (pp. 301-345); Hydra and other Fresh-water Hydrozoa, by F. Smith (pp. 316-322); The Free-living Worms (Turbellaria), by Caroline E. Stringer (pp. 323-364); Parasitic Flatworms, by H. B. Ward (pp. 365-453); The Nematodeans, by W. R. Coe (pp. 454-484); Free-living Nematodes, by N. A. Cobb (pp. 485-505); Parasitic Roundworms, by H. B. Ward (pp. 506-552); The Wheel Animalcules (Rotatoria), by H. S. Jennings (pp. 553-620); Gastrotricha, by H. B. Ward (pp. 621-632); Aquatic Earthworms and Other Bristle-bearing Worms (Chaetopoda), by F. Smith (pp. 632-645); The Leeches (Hirudinea), by J. P. Moore (pp. 646-666); The Fairy Shrimps (Phyllopoda), by A. S. Pearse (pp. 661-675); The Water Fleas (Cladocera), by E. A. Birge (pp. 676-710); Copepoda, by C. D. Fernald (pp. 741-789); The Ostracoda, by R. W. Sharpe (pp. 790-827); High Malacostraca (Malacostraca), by A. E. Ormeau (pp. 828-850); The Water Bugs (Hydracarina), by R. H. Wolcott (pp. 851-875); Aquatic Insects, by J. C. Needham (pp. 876-946); Moss Animalcules (Bryozoa), by C. B. Davenport (pp. 947-956); The Mollusca, by B. Walker (pp. 957-1026); The Aquatic Vertebrates, by C. H. Eigenmann (pp. 1021-1066); and Technical and Sanitary Problems, by G. C. Whipple (pp. 1067-1083).

Extirminating predatory animals, E. W. NELSON (*Nat. Wild. Groucer*, 8 (1918), No. 3, pp. 14-16).

Rodents of Colorado in their economic relation, W. L. BERNERT (*Off. State Nat. Colo. Circ.* 25 (1918), pp. 31, figs. 15).—The author here presents an economic treatment of each genus and many of the species of mammals known to occur in the State, together with a list of the others.

A bibliography of British ornithology from the earliest times to the end of 1912, W. H. MULLENS and H. K. SWANN (*London: Macmillan & Co., Ltd.*, 1916, pts. 2, pp. 113-240; 3, pp. 241-324; 4, pp. 325-406; 1917, pts. 5, pp. 407-624; 6, pp. 625-691+XX).—These parts complete the work, part 1 of which has been previously noted (*E. S. R.*, 36, p. 251).

List of generic terms proposed for birds during the years 1890 to 1900, inclusive, to which are added names omitted by Waterhouse in his *Index Generum Avium*, C. W. RICHMOND (*Proc. U. S. Nat. Mus.*, 24 (1902), pp. 663-670).—This list supplements Waterhouse's *Index Generum Avium*.

Generic names applied to birds during the years 1901 to 1905, inclusive, with further additions to Waterhouse's *Index Generum Avium*, C. W. RICHMOND (*Proc. U. S. Nat. Mus.*, 35 (1909), pp. 583-655).—A second supplementary list.

Generic names applied to birds during the years 1906 to 1915, inclusive, with additions and corrections to Waterhouse's *Index Generum Avium*, C. W. RICHMOND (*Proc. U. S. Nat. Mus.*, 52 (1917), pp. 565-636).—A third supplementary list.

New light on the status of *Empidonax traillii*, H. C. OBERHOLSER (*Ohio Jour. Sci.*, 18 (1918), No. 3, pp. 85-98).—The author recognizes a new sub-

<sup>1</sup>*Index Generum Avium*, by F. H. Waterhouse (London: R. H. Porter, 1889, pp. 249).

species, *E. traillii brewsteri*, 209 specimens of which flycatcher were examined from various localities in the United States and Central America.

**The woodpeckers of Colorado.** F. C. LINCOLN (*Colo. Mountain Club Publ.*, 6 (1917), pp. 22, figs. 13).—Nine species are described as occurring within the State.

**The Acanthocephala of North American birds.** H. J. VAN CLEAVE (*Trans. Amer. Micros. Soc.*, 37 (1918), No. 1, pp. 19-47, figs. 34).—This reports the results of a study of the Acanthocephala parasitic in birds from the United States Government and private collections. It is pointed out that the occurrence of two different species of Acanthocephala within the same host individual has never been recorded, and that there is no positive case on record of the occurrence of two different genera of Acanthocephala within the same species of North American birds. Tables are given showing the comparison of acanthocephalan infestation in the families and orders of birds of central Europe and of North America, together with a key to all described species of Acanthocephala from North American birds.

A list of 15 titles to the literature cited is included.

**On the trematodes of Australian birds.** S. J. JOHNSTON (*Jour. and Proc. Roy. Soc. N. S. Wales*, 50 (1916), pt. 2, pp. 187-261, pls. 11, figs. 10).—Included in this paper are descriptions of one new genus and 21 new species, a list of the trematode parasites arranged according to the classification of the hosts together with the nearest relative of the trematode and its host, so that the relationships of the hosts may be readily seen, and a bibliography of 48 titles.

**Larval trematodes from Kansas fresh-water snails.** E. C. O'ROKE (*Kans. Univ. Sci. Bul.*, 10 (1917), No. 7, pp. 161-180, pls. 7).—This report of studies of larval trematodes from fresh-water snails includes descriptions of new forms.

**A census of the endoparasites recorded as occurring in Queensland, arranged under their hosts.** T. H. JOHNSTON (*Proc. Roy. Soc. Queensland*, 2 (1916), pp. 51-79).—This is a list of internal parasites recorded definitely from Queensland. A 12-page list of the literature referring to the presence of endoparasites in Queensland is included.

**[Report of the] entomological branch.** M. BURRELL (*Rpt. Min. Agr. Canada*, 1917, pp. 78-82).—A brief summary of the work of the year.

**[Insects and their control in Antigua].** F. WATTS (*Imp. Dept. Agr. West Indies, Rpt. Agr. Dept. Antigua, 1916-17*, pp. 16, 17).—A brief account is given of the occurrence of the more important insect enemies of sugar cane, cotton, limes, sweet potatoes, Indian corn, and onions, and means for their control.

**[Lists of economic insects in France].** P. NOEL (*Bul. Lab. Régional Ent. Agr. [Rouen]*, 1917, Nos. 2, pp. 6, 7, 8, 9, 11, 12, 18-15; 3, pp. 6-16; 4, pp. 10, 11).—Annotated lists are given of insects attacking special crops in France, including variegated reed grass (*Phalaris*), Phleum, foxtail (*Alopecurus*), sainfoin (*Hedysarum*), vetch (*Vicia*), dyer's broom (*Sorothamnus*), and oat straw (*Avena elatior*).

**Annual report of the government entomologist.** C. C. GOWDEY (*Ann. Rpt. Dept. Agr. Uganda, 1917*, pp. 32-37).—The more important pests of the year are reported upon under the headings of those attacking coffee, cacao, tea, rubber, fruit trees, the shade tree *Gliricidia maculata*, etc. A list of beneficial parasites and predators reared during the year, together with their hosts, is included.

**Division of entomology, annual report, 1915-16.** C. P. LOUNSBURY (*Union So. Africa Dept. Agr. Rpt., 1916*, pp. 83-103).—This is a detailed report of the entomological work of the year, in which particular consideration is given to the occurrence of and work with locusts.

Administration report of the government entomologist for 1916-17, T. V. JAYAKRISHNA AYYAR (*Rpt. Dept. Agr. Madras, 1916-17, pp. 61-64*).—A brief statement of the work of the year with insect pests in Madras.

A catalogue of the Lepidoptera, edited by H. WAGNER (*Lepidopterorum Catalogus, Berlin: W. Junk, 1912, pt. 10, pp. 86; 1913, pls. 11, pp. 65; 12, pp. 77; 13, pp. 53; 14, pp. 192; 15, pp. 28; 16, pp. 35; 17, pp. 44; 1914, pls. 18, pp. 79; 19, pp. 64; 20, pp. 55*).—In continuation of the parts previously noted (E. S. R., 28, p. 252), part 10, by E. Meyrick, catalogues the Tortricidae; part 11, by Heringham and Jordan, the subfamily Aecaeinae of the Nymphalidae; part 12, the subfamily Acherontiinae, and part 18, the subfamilies Ambulicninae and sections of the Sphingidae, by H. Wagner; part 13, by E. Meyrick, the families Cossopodidae, Heliodinidae, and Glyphipterygidae; part 14, by L. R. Prout, the subfamily Hemiteuthinae of the Geometridae; part 15, by K. W. von Dalla Torre, the subfamilies Castniinae, Neocastniinae, and Pomphigostolinae of the Castnidae; part 16 the Brahmaeidae, by E. Strand, and the Megalopygidae, Eulcoridae, and Aglyptidae, by H. G. Dyar and E. Strand; parts 17 and 19, by E. Meyrick, the Pierophoridae and Orneodidae; and the Hyponomeutidae, Plutellidae, and Agathididae, respectively; and part 20, by K. W. von Dalla Torre, the Lyrididae.

Report of the assistant professor of entomology, MADAN MOHAN LAL (*Rpt. Dept. Agr. Punjab, 1917, pp. IX, X*).—A brief report upon the occurrence of and control work with the more important insect pests of the year, including a note on sericulture.

Report of the division of entomology, F. P. JARSON (*Fiji Dept. Agr. Ann. Rpt. 1916, pp. 16-25*).—The more important insects injurious to cultivated crops including bananas, coconuts, cacao, etc.; to fruit trees and vegetables, including oranges and mandarines, etc.; to ornamental plants; and to man and animals, etc., during 1916 are considered.

Entomological notes, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 28 (1917), No. 12, pp. 891-895, figs. 3*).—Notes are presented on the yellow-barred grass moth (*Elasmia terminalis*), a stag-horn fern pest (*Halticoreus platyceri*), and a remarkable click beetle (*Tetralobius forthuini*).

Important clover insects, H. A. GOSSARD (*Mo. Bul. Ohio Sta., 3 (1918), No. 5, pp. 199-193, figs. 2*).—In continuation of this series of popular articles on clover insects (E. S. R., 39, p. 264), the clover seed chalcid fly and clover seed weevil (*Enarmonia interstinctana*) are considered.

Insects of a citrus grove, J. R. WATSON (*Florida Sta. Bul. 148 (1918), pp. 163-165, figs. 68*).—Brief accounts are given of the more important injurious insects of citrus in Florida and means for their control. A list of publications relating to citrus insects in Florida is included, together with an index to the subject matter.

Insects injurious to the pecan, J. MATZ (*Florida Sta. Bul. 147 (1918), pp. 159-161, figs. 14*).—Brief accounts are given of the more important insect enemies of the pecan in Florida with control measures therefor. The pests considered are the pecan leaf case bearer (*Acrobasis nebulella*), pecan nut case bearer (*A. cecidella*), pecan shuckworm (*Enarmonia laspeyresia caryana*), pecan cigar case bearer (*Coleophora caryafohiella*), fall webworm, walnut caterpillar (*Pantana integerrima*), pecan bud moth (*Proctoperne bolliana*), flat-headed spire-tree borer, hickory twig girdler (*Oncicercus cingulatus*), red-shouldered shot-hole borer (*Sinoxylon xylobiops basilaris*), oak or hickoryossid (*Cossus magnifica*), and hickory phylloxera (*Phylloxera caryaeuulidis*).

Insect pests of basket willows, J. C. F. FRYER (*Jour. Bd. Agr. [London], 24 (1917), No. 8, pp. 844-852, pls. 4*).—A summary of information on the more important insect enemies of the basket willows.



Insects and the national health, C. T. BRUES (*Sci. Mo.*, 6 (1918), No. 8, pp. 193-209, figs. 14).—The importance of insects in the dissemination of disease is emphasized.

Progress report of special committee on the damage to stored grain by insects, L. ROSSSELL, W. W. FROGGATT, and W. A. HASWELL (*Advisory Councils and Indus., Aust., Bul.* 5 (1917), pp. 20-23).—This report includes a discussion of the development of weevils in wheat and the increase in number of weevils, destruction of weevils by means of poisonous gases and by drying, favorable and unfavorable conditions, etc.

Fumigation with chlorpierin, W. MOORE (*Jour. Econ. Ent.*, 11 (1918), No. 4, pp. 357-362).—The author's experiments at the Minnesota Experiment Station, here reported, are summarized as follows:

"Chlorpierin used at the rate of from 0.5 to 1 lb. to 1,000 cu. ft. will destroy insects which require from 3 to 8 lbs. of carbon bisulphid. There is less likelihood of injury to germination than in the use of carbon bisulphid, but at normal doses, if the grain is dry and is thoroughly aired after fumigation, injury results. Chlorpierin is able to penetrate through 50-lb. sacks of flour in 24 hours at a temperature of 70° F., killing all the insects. Chlorpierin has a slight injurious influence on the baking qualities of flour. Chlorpierin free from impurities of chlorine and nitrogen peroxid will injure neither dress materials nor their color." Its value as a fumigant to destroy the clothes louse (*Pediculus humanus [vestimentis]*) and its eggs has been reported (E. S. R., 38, p. 765).

The biology of dragonflies (Odonata or Paraneuroptera), R. J. TILNEY (*Cambridge, Eng.: University Press*, 1917, pp. XII+396, pls. 4, figs. 188; *Trans. Jour. Roy. Micros. Soc.*, No. 1 (1918), pp. 55, 56).—This work presents a full and complete account of the biology of the Odonata so far as the present state of knowledge permits.

Grasshoppers, T. L. GUYTON (*Mo. Bul. Ohio Sta.*, 3 (1918), No. 7, pp. 24-207).—A popular summary of information on grasshoppers and their control.

Experiments on the physiology of digestion in the Blattidae, E. W. SAYERS (*Jour. Expt. Zool.*, 25 (1918), No. 2, pp. 355-411, figs. 21).—An abstract of the article has been previously noted (E. S. R., 38, p. 558).

On a collection of Thysanoptera from St. Vincent, with descriptions of four new species, R. S. BAGNALL (*Jour. Zool. Research*, 2 (1917), No. 1, pp. 41-52, figs. 3).—Notes are presented on eight species, of which four are described as new.

The southern green plant bug, T. H. JONES (*U. S. Dept. Agr. Bul.*, 659 (1918), pp. 27, figs. 14).—This is a report of studies conducted principally at Baton Rouge, La., of *Nezara viridula*, a serious pest of cultivated plants in the southern portion of the United States, particularly in the Gulf States.

The species is recorded from the whole of Europe except the extreme north, Asia, Africa, Malaysia, Australia, New Zealand, South America, at least in the north, Central America, and enters into the United States at the South. Young growing shoots and developing fruits are most seriously injured. It has been recorded as feeding on beans, cotton, cowpea, *Gynandropsis pentaphylla*, blackberry, okra, maize, mulberry, orange, peas, pepper, potato, rice, sugar cane, sunflower, sweet potato, tomato, and turnip. The author has taken it on a number of these plants and, in addition, on Brussels sprouts, cauliflower, collards, egg plant, globe artichoke, mustard, and radish.

The number of eggs deposited by different females varied greatly, ranging from 0 to 240. A female which had laid 240 eggs was found to have 77 well-developed eggs in its ovaries at time of death. The eggs are placed on the

the underside of the leaves in clusters of from 35 to 116 eggs. "In the insectary the minimum period necessary for the incubation of the eggs was 5 days. For the five nymphal stages the minimum periods were 3, 4, 5, 6, and 7 days, respectively, a total of 30 days for the egg and nymphal stages."

They have been found in the field at Baton Rouge as early as April 13 and as late as November 8. It is probable that in this latitude four generations may develop in a year. Adults are found hibernating during the winter months, but they also occur on plants in the field during mild periods of weather during the season.

Four enemies have been observed, the tachinid fly *Trichopoda pennipes* recently being the most important.

As a method of control the collection and destruction of eggs, nymphs, and adults is recommended where valuable vegetable crops are attacked. Adults congregate on turnip and mustard during the fall and a few of these plants, or others on which they congregate, might be grown as trap crops in cotton fields to cause serious injury by the species occurs. The adults may be collected from these plants and destroyed."

An annotated bibliography of 14 titles is included.

**A new corn insect from California.** C. J. DRAKE (*Jour. Econ. Ent.*, 11 (1918), Vol. 1, p. 485).—A new lace bug taken from corn in the Grass Valley, Cal., is here described as *Corythucha essigi*.

**The West Indian cotton stainer (*Dysdercus delauneyi*)** (*Emp. Dept. Agr. Ind. India, Rpt. Agr. Dept. St. Vincent, 1916-17, pp. 11-15*).—A brief account of the life history and control of this cotton stainer, a more detailed account of which has been previously noted (E. S. R., 38, p. 461).

**Contribution to the knowledge of *Toxoptera graminum* in the South.** F. L. ASHLEY and A. H. BEYER (*Jour. Agr. Research [U. S.], 14 (1919), No. 2, pp. 119-126, pl. 1, figs. 8*).—This is a report of life history studies made at a field station of the Bureau of Entomology of the U. S. Department of Agriculture at Columbia, S. C., with a view to supplementing those conducted primarily in the North and reported upon by Webster and Phillips (E. S. R., 27, p. 859). The study was begun in the spring of 1913, continued through the year 1914 and to the spring of 1915.

The investigation shows that oviparous forms develop in the latitude of Columbia, S. C. Whether or not the strain becomes weaker as it grows older requires further experimentation, although the experiments would indicate that to be the case.

***Eritrhidia euryophthalmi* n. sp., from the hemipteran bug, *Euryophthalmus curvatus*.** IRENE McCULLOCH (*Univ. Cal. Pub. Zool.*, 13 (1917), No. 5, pp. 75-76, figs. 35).—The digestive tract of 80 per cent of the bugs (*E. curvatus*) that fed upon one of the common lupines (*Lupinus arboreus*) in the vicinity of San Francisco is said to be heavily infested by a flagellate (*E. euryophthalmi* n. sp.), the life cycle of which is here considered.

**African Aphididae, I-III.** F. V. THEOBALD (*Bul. Ent. Research*, 4 (1914), No. 1, pp. 313-337, figs. 17; 6 (1915), No. 2, pp. 103-153, figs. 38; 8 (1918), No. 3, pp. 223-264, figs. 15).—These papers include descriptions of 9 species, 3 genera and 19 species, and 12 species, respectively, new to science.

**Wild cochineal insects as prickly-pear destroyers.** J. WHITE HANEY (*Ann. Ent. Dept. Pub. Lands Queensland, 1915, pp. 92-94, pl. 1*).—In addition to a brief account of the destruction of *Opuntia monacantha* by *Coccus indicus*, a discussion of which has been previously noted (E. S. R., 35, p. 55), mention is made of its destruction also by *C. confusus capensis* from South Africa and of the possibility of wild cochineal insects attacking useful plants.

The pine scale (*Leucaspis pini*) in Argentina, J. BRÈTHES (*Ann. Sci. Nat. Argentina*, 51 (1917), No. 5, p. 384, fig. 1).—The occurrence of this European scale in Argentina is reported for the second time, having first been recognized in 1906 from Mendoza. The present record is from the south of the Province of Buenos Aires.

A list of Uganda Coccidæ, their food plants and natural enemies, C. H. GOWDEY (*Bul. Ent. Research*, 8 (1917), No. 2, pp. 187-189).—Seventy-two species are recorded.

The status of introduced coccids in South Africa in 1917, C. K. BAYNE and A. E. KELLY (*Bul. Ent. Research*, 8 (1917), No. 2, pp. 181-185).—An annotated list of 55 species.

Instructions for collecting and preserving valuable Lepidoptera, J. SPANGLER (*Los Angeles, Cal.: Author*, 1917, pp. 80, figs. 72).—Instructions for collecting and preserving Lepidoptera are presented in popular form.

Sericulture in tropical countries, A. FAUCHÈRE (*La Sériciculture en pays Tropical. Paris: Augustin Challamel*, 1917, pp. 119, figs. 26).—This is a report upon the acclimatization of the mulberry silkworm and of the mulberry in Madagascar. The several chapters deal with the culture of the mulberry, the rearing of the silkworm, diseases and enemies of the silkworm, production of silkworm eggs, summary of a study of the cocoons and of raw silk products in Madagascar, and the importance and future of sericulture in the interior of Madagascar.

Female Lepidoptera at light traps, W. B. TURNER (*Jour. Agr. Res.*, [U. S.], 14 (1918), No. 3, pp. 135-149).—This report is based upon extended observations made during the summer of 1916 at a field station of the Bureau of Entomology of the U. S. Department of Agriculture at Hagerstown, Md., with a view to securing some definite information as to the relative proportions of the sexes of moths attracted to light and the percentage of gravid females among those so taken. The results are reported in detail in tabular form. The material collected and examined included over 11,000 individuals, representing 3 families and about 20 species.

"Of the 11,222 moths examined 8,025, or 71.5 per cent were males; 3,197, or 28.5 per cent were females. In only one species, *Noctua c-nigrum*, did the females taken equal or exceed the males." Of 3,197 individuals dissected 1,877 or 58 per cent, were gravid. These gravid females made up 16.6 per cent of the 11,222 moths examined. All the females of 4 of the 6 species of *Arctia* under observation were gravid, and in the two other species the gravid females represent 85.5 per cent and 96 per cent of the females collected.

Brief abstracts of the literature on the subject, together with a bibliography of 16 titles are included.

Partial disinfection of mulberry leaves in feeding silkworms, ROSA SERRA (*Staz. Sper. Agr. Ital.*, 50 (1917), No. 2, pp. 49-68; *abs. in Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr.*, 8 (1917), No. 7, pp. 1927, 1928). The author reports upon experiments made to determine the value of partial disinfection in protecting the worms from attacks of flacherie and in increasing the vigor of vegetative growth. The following conclusions are drawn from the results obtained:

"If the silkworms are fed on leaves washed with water or an aqueous solution of lysoform or 'tachiol' far fewer leaves are consumed than if they have not been subjected to the treatment described. Although silkworms fed on moist leaves eat less they weigh more than those fed on dry leaves. The treatments described did not prevent the occurrence of a few sporadic cases of flacherie and emaciation.

"The silk cover of cocoons from silkworms fed on partially sterilized leaves is heavier than that from silkworms fed on ordinary leaves. This increased

might also occurs when the silkworms are fed on leaves sufficiently well washed with fresh or boiled spring water. The feeding of silkworms with washed leaves has a favorable influence on the quality of the silk, particularly on the length, tenacity, and elasticity, as well as the weight of the reeled silk."

Notes on the poisonous urticating spines of *Hemileuca olivacea* larvae, D. J. GUNN (Jour. Econ. Ent., 11 (1918), No. 4, pp. 363-367). The author reports on the spines of the New Mexican range caterpillar, showing them to be a source of danger and discomfort to people coming in contact with the caterpillars.

The effect of the poisonous agent in these spines appears to be accumulative in nature rather than to confer any degree of immunity through continual contact. The injury may be internal or external. The external injury varies in severity according to the part of the body affected and may lead to partial paralysis for short periods. The internal injury is more severe than the external injury, and in advanced cases may result in typical asthmatic symptoms and other disorders of the respiratory tract. The urticating spines from the shed skins of the larvae become scattered through the range grasses and other small areas unfit for grazing."

The false tussock caterpillars on shade trees, J. M. SWAINE (Agr. Gaz. South. A. (1917), No. 12, pp. 1043-1047, figs. 6).—A brief account is given of the grey tussock moth (*Halisidota caryæ*), the spotted tussock moth (*H. maculata*), and the pale tussock or checkered tussock moth (*H. tessellaria*). These were the most abundant and widely distributed of the defoliating caterpillars, of which there was a rather severe outbreak in eastern Canada during the summer of 1917. The common ichneumon *Scambus pedalis* is the most abundant parasite reared from *Halisidota* cocoons. *Theronia melanocephala* and *Analytetus* species are said to have been reared from *Halisidota* caterpillars.

Descriptions of new Lepidoptera from Mexico, H. G. DYAR (Proc. U. S. Nat. Mus. 54 (1918), pp. 335-372).—The present paper includes descriptions of 417 new species and 12 new genera, a synoptic table, and a reference to synonymy.

The small cabbage moth (*Plutella maculipennis*), D. GUNN (Union So. Afr. Dept. Agr. Bul. 8 (1917), pp. 10, figs. 8).—A brief summary of information on the diamond-back moth (*P. maculipennis*), a widespread enemy of cabbages in South Africa, and means for its control.

The white-marked tussock moth and its control on shade trees and orchard trees, J. M. SWAINE and G. E. SANDERS (Canada Dept. Agr., Ent. Branch Circ. 1 (1918), pp. 12, figs. 9).—A popular article prepared to furnish information on the control of the white-marked tussock moth, a widespread pest throughout western Canada which periodically causes serious damage to shade trees and fruit.

Notes on the migration of the Hessian fly larvae, J. W. MCCULLOCH and H. HESS (Jour. Anim. Behavior, 7 (1917), No. 5, pp. 397-323, figs. 3).—This is a report on Hessian fly investigations, conducted at the Kansas Experiment Station, which are summarized by the authors as follows:

"The direction of the migration of the larva in its initial stage is predetermined by the orientation of the eggs. The larvae on hatching always turn from the anterior toward the posterior end of the eggs. The degree of inclination of the leaf has nothing to do with the direction of the larval migration. The larvae are capable of locomotion on either an ascending or descending incline anywhere between zero and 90°. When the eggs are laid with their anterior ends toward the base of the leaf, the larvae, on hatching crawl up the leaf until they reach the tip, then turn and move downward. The larvae may die on this ascending migration, but apparently never try to change the direction of progress.

"The rate of migration is extremely variable and seems to be influenced by individual differences rather than physical factors. The average time required by 205 larvae hatching from eggs laid normally to move 1 mm. was about 2 minutes, with extremes of 0.5 minute and 75 minutes. The average time required by 119 larvae hatching from eggs deposited in an inverted position to move 1 mm. was about 3.5 minutes, with extremes of 0.4 of a minute and 1.5 minutes.

"The mortality of migrating larvæ is greatest when the eggs are laid in an inverted position. Twenty-three per cent of the larvæ hatching from eggs laid normally died on migration, while 57 per cent of the larvæ hatching from eggs deposited in an inverted position perished. When the eggs are deposited normally, the percentage of mortality increases with the distance of the egg from the ligule. When the eggs are laid in an inverted position, the mortality increases with the distance of the egg from the tip of the leaf."

A simple method of identifying the *Anopheles* mosquitoes of the Canal Zone, L. H. DUNN (*Proc. Med. Assoc. Isthmian Canal Zone*, 9 (1916), pt. 2, pp. 64-68).—The author presents a simplified table for the identification of species occurring in the Canal Zone, of which 7 are quite commonly met with.

Control of house flies by the maggot trap method, E. N. CORY (*Medical Sta. Bul.* 213 (1918), pp. 103-126, figs. 12).—This bulletin reports upon the results of 3 years' studies conducted at the station in cooperation with the Bureau of Entomology of the U. S. Department of Agriculture, the work of the year (1914) having been previously reported upon by Hutchison (E. S. R. R. p. 156).

The average percentage of maggot destruction during the 3 years was 60 per cent. The reduction in fly prevalence amounted to 76 per cent in 1914 but was not so marked in the 2 years following, due apparently to the presence of additional fly breeding sources and the difficulty of obtaining accurate results. Modifications of the traps as a result of experience have evolved a trap that is practical for the farm producing large quantities of manure daily.

It is pointed out that close packing of manure, watering the pile, and the return of leached materials to the manure tend to conserve the fertilizing value of the manure. "The labor involved is only slightly greater than that required to dump the manure in a pile. The difference is in the time required to water the pile daily and to clean the basin once every two or four weeks depending upon whether one or two traps are constructed. The saving in fertilizer and the destruction of a large percentage of the flies, particularly on isolated farms, will more than repay the cost of construction and operation."

The life history and habits of *Chloropisca glabra*, a predacious oscinid, J. L. PARKER (*Jour. Econ. Ent.*, 11 (1918), No. 4, pp. 368-380, fig. 1).—The author's studies at the Montana Station show that the larvæ of this oscinid are predacious upon the sugar beet root louse, it being the first species of the group known to possess predacious habits.

The eggs are deposited about the base of the sugar beet plants and of *Cladopus albus*. Dissections of 30 females showed the presence of from 32 to 64 eggs, with an average of 52. The incubation period in August is from 3 to 5 days.

Though never detected attacking or feeding upon root lice in the field, when confined with them in small tin boxes the maggots feed quite readily. The point of attack is generally on the side of the first segment of the abdomen and more rarely on the ventral surface. The maggot's head is inserted into the aphid and the soft body contents are sucked out.

The larval period in the field appears to vary from 10 to 20 days. The pupal period generally extends from some time in August or September until the

May, or a period of about 9 months, but a few individuals may overwinter the same season in which the puparia are formed, remaining in the pupal stage only 2 or 3 weeks. The winter is passed as a puparium in the soil where the larva completed feeding.

Three maggots were able to complete their growth and pupate on a food supply of only 21 large aphids per maggot, while another larva after it was apparently full grown consumed 52 aphids. It is probable that maggots under natural conditions in root louse colonies where food is always within reach would each consume as many as 75 aphids."

The studies show this dipteran to be by far the most effective insect enemy of the sugar beet root louse, the worst pest with which the sugar beet growers of Montana have to contend. "Hundreds of puparia have frequently been found in the soil around a single sugar beet, which means that large numbers of root lice have been destroyed. The larva is particularly efficient in that it concentrates its efforts on destroying only well-developed root lice, thus checking the birth of young root lice that would soon increase to enormous numbers. It is not uncommon to find a large number of puparia in the soil around a sugar beet plant with only the empty skins and secretions of the root lice to indicate their former abundance.

It is certain that *C. globra* larvae act as a very important check upon the increase of sugar beet root lice and in many instances destroy entire colonies." Second paper on Brazilian Muscoidea collected by Herbert R. Smith, C. H. Townsend (*Bul. Amer. Mus. Nat. Hist.*, 47 (1917), pp. 211-255).

Effect of humidity on pupal duration and on pupal mortality of *Drosophila ampelophila*, A. ELWYN (*Bul. Amer. Mus. Nat. Hist.*, 47 (1917), pp. 371-376, fig. 1).—The data presented are summarized by the author as follows:

"Changes in relative humidity have no marked effect on the length of pupal period of *D. ampelophila*. Changes in relative humidity produce striking changes in the mortality of *Drosophila*, the mortality increasing with a decrease of humidity [and] the optimum humidity being 100 per cent. The effects of low humidity on mortality are most marked with very young pupae, whose integument permits a rapid evaporation of body moisture. After a few hours integumental changes making evaporation more difficult have set in, the effects of low humidity are correspondingly decreased."

A dipterous parasite of terrestrial isopods (*Phyto melanocephala*), W. R. LEWIS (*Compt. Rend. Soc. Biol. [Paris]*, 80 (1917), No. 16, pp. 785-788, figs.). Also in *Rev. Appl. Ent.*, Ser. A, 6 (1918), No. 1, p. 25).—The tachinid *P. melanocephala* was found to be a fairly common parasite of *Porcellio scaber* and *Porcellio scaber* in the neighborhood of Portsmouth, England.

Some practical methods adopted for the control of flies in the Egyptian campaign, J. DAVINSON (*Bul. Ent. Research*, 8 (1918), No. 3-4, pp. 297-303, figs.).

The author outlines the methods followed in dealing with the fly problem while commanding a sanitary section of the Egyptian Expeditionary Force during the year 1916-17.

The control of the clover flower midge, C. W. CREEP and L. P. ROCKWOOD (*U. S. Dept. Agr., Farmers' Bul.* 871 (1918), pp. 12, figs. 6).—A popular account of *Mayetiaca leguminicola*. Control measures include light or deep pasturing, cutting or late cutting, clipping, and soiling.

Controlling the clover flower midge in the Pacific Northwest, C. W. CREEP and L. P. ROCKWOOD (*U. S. Dept. Agr., Farmers' Bul.* 942 (1918), pp. 12, figs.).

A discussion of control measures for this pest in the Northwest, which are, for the most part, the same as those followed in the East as described in the publication noted above.

Observations on certain flies infecting meat or causing human myiasis. G. DEXLER (*Ztschr. Fleisch u. Milchhyg.*, 27 (1916), Nos. 3, pp. 35-38; 4, 11, 2, 54; 5, pp. 68-71; abs. in *Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr.*, 8 (1917), No. 7, pp. 968, 969).—This is a report of observations on live adults, eggs, larvae, pupae, etc., of flies found to visit meat in two of the largest meat markets in Vienna.

"The species most frequently occurring on meat are *Lucilia sericata*, *Phora erythrocephala*, *Sarcophaga hamorrhoidalis*, *S. murus*, *S. fahaka*, *Phormia groenlandica*, *Muscina stabulans*, *Pannia canicularis*, and *E. aestiva*. The following rarely occur on meat: *Ophyra leucostoma* and *Drosophila obscura*; they feed on it, but never oviposit. The same thing holds for *M. domestica*, *C. vomitoria*, *S. carnaria*, *Musca meridiana*, and *Stomoxys calcitrans*. The presence of the larvae of these flies affords no evidence as to whether the meat is putrid or not.

"The dimensions of the larvae can only be determined with precision after they have been killed; the size is practically of no use for determining the length of infection. If the infected meat is exposed to a temperature of 100° [50° F.] the process of hatching is arrested and the eggs gradually die off; the larvae die if exposed to direct sunlight or if the medium in which they are becomes dry. A temperature of below 7° arrests the development of the larvae but does not kill them. The optimum growth temperature is between 20° and 40°. The larva pupates on the fifth or sixth day after hatching, both at the above temperatures or at a temperature of 15 to 17°. Meat containing larvae can be dangerous to man if eaten raw.

"No effective method is yet known for protecting meat from becoming infested with flies. At present the best way is to keep the meat in a cool, dark place. The larvae are not killed either by washing the meat with vinegar or a solution of potassium permanganate, or even by immersing the meat in these two liquids."

Supplement to preliminary list of the Coleoptera of the West Indies. C. P. LENG and A. J. MUTHLER (*Bul. Amer. Mus. Nat. Hist.*, 37 (1917), pp. 191-226). The additions, corrections, and notes included in this paper supplement the list previously noted (*E. S. R.*, 34, p. 556).

The elm-leaf beetle (*Galerucella luteola*) in Spain in 1917. J. DANTIN CALCEDA (*Liga Agraria*, 30 (1917), No. 1139, p. 2; abs. in *Internat. Inst. Agr. [Rome], Internat. Rev. Sci. and Pract. Agr.*, 8 (1917), No. 10, p. 1446).—An account of the biology of and control measures for the elm-leaf beetle in Spain, in which country its greatest injury was caused in 1917.

Carabidae injurious to the strawberry. P. LESNE (*Jour. Agr. Prat.*, n. s. 30 (1917), No. 26, pp. 504, 505, figs. 2).—Brief reference is made to several carabids which are a source of injury to the strawberry. See also a previous note (*E. S. R.*, 38, p. 654).

It is pointed out that there is in the family Carabidae a series of species in which the food is normally phytophagous (*Zabrus*, *Ditomis*, etc.) or carnivorous (certain *Amara*, etc.), and another series comprising carnivorous species which show a liking for the sweet pulp of fruits (*Carabus*, *Calathus*, etc.). The European species which have been a source of injury to ripe fruit are *Phedrusus melanarius*, *Steropus madidus*, *Calathus fuscipes*, *Ophonus ruficornis*, and *Harpalus distinguendus*.

The cane grubs of Australia. II. A. P. DOON (*Bur. Sugar Expt. Stas. Queensland, Div. Ent. Bul.*, 6 (1917), pp. 30).—This report is in continuation of investigations previously noted (*E. S. R.*, 35, p. 57).

The habits and control of white grubs in Manitoba, N. CHUBB (Agr. Gaz. Canada, 5 (1918), No. 5, pp. 449-454, figs. 4).—This article deals with the four species of white grubs known to occur at the present time within the Province of Manitoba, namely, *Lachnosterna annua*, *L. nitida*, *L. drakii*, and *L. rugosa*.

A possible factor in coconut-beetle control, P. J. WILSON (Philippine Agr. [English Ed.], 10 (1917), No. 3, pp. 299, 300).—Mention is made of a flying squirrel (*Calcoptihacus* sp.), commonly known as caguan, occurring in the interior of the island of Bohol, which has been domesticated by the Filipinos and reared for its skin and partly for catching coconut beetles. It is thought that this mammal may prove to be of sufficient value in combating the coconut beetle to warrant rearing it.

The maize beetle (*Heteronychus mashunus*), R. W. JACK (Rhodesia Agr. J., 15 (1918), No. 1, pp. 10-16, pls. 2).—An account of the life history and habits and control measures of this beetle, which has been the cause of heavy loss to corn growers in various parts of Rhodesia.

The beetles attack the seed as it germinates and the plants at almost any time during growth, the young shoot from the seed frequently being destroyed so that the plant does not appear above ground. The stalks of the larger plants are eaten into an inch or two beneath the surface of the soil, resulting in the withering of the center of the plant.

Notes on *Eleodes tricornata*, H. B. PARKS (Jour. Econ. Ent., 11 (1918), No. 4, p. 383).—Referring to the paper by McColloch previously noted (E. S. R., 30, 1918), the author states that this pest has been reported in destructive numbers during the season of 1918 with few exceptions from every county in Texas from Wilbarger on the north to Jim Wells on the south, and from Callahan east to the State line. The work of the larva somewhat resembles that of the true worms, but it will also climb large plants and cut off buds and leafstalks. It was very heavily on radishes, cabbage, onions, tomatoes, potatoes, corn, cane, and almost everything else in garden or field. Most gardeners were satisfied with the results obtained from the use of poisoned bran mash, Paris green giving better results than arsenate of lead.

Clover root borer, J. H. STEAR (Mo. Bul. Ohio Sta., 3 (1918), No. 6, pp. 187-188, figs. 2).—A popular article on *Hylastinus obscurus*.

A new scolytid injurious to dried sweet potatoes in Jamaica, W. SAMPESON (Bul. Ent. Research, 8 (1918), No. 3-4, p. 295).—A beetle which causes serious damage to dried sweet potato chips in Jamaica is described as *Hypothenemus* *sticticus* n. sp.

The cigarette beetle, D. B. MACKIE (Philippine Agr. Rev. [English Ed.], 19 (1918), No. 3, pp. 225-241, figs. 5).—This discussion includes an account of the life history of the cigarette beetle and directions for the fumigation of tobacco by the vacuum method.

A new weevil pest of sweet potatoes in Jamaica, G. A. K. MARSHALL (Bul. Ent. Research, 8 (1918), No. 3-4, pp. 269-272).—Under the name *Palaeopus castaneus* the author describes a new weevil from Jamaica, where it is a source of damage to sweet potato tubers, the injury resembling that caused by the "scarab" (*Euscepes batatae*). *P. grenadensis* from Grenada and *P. subgranulatus* from St. Vincent, which it is thought may have similar habits, are also described as new. A table is given for the identification of the five known species of this genus.

Honeybees and honey production in the United States, S. A. JONES (U. S. Agr. Bul. 685 (1918), pp. 61, fig. 1).—Statistical data relating to honeybees and honey production in this country are presented and discussed. Tabular data are given on the number of colonies of bees on farms; percentage of total



swarming by months; winter confinement, food supply, and protection; losses by disease and in wintering; winter losses, causes and percentage; annual yield of honey per colony; honey production; form in which honey is produced; disposition of crops; value of exports of domestic honey, 1911-1917; exports into the United States, 1911-1917; honey prices, 1913-1917; principal plants furnishing nectar and pollen, with average dates of beginning and ending of blooming periods; and sources of surplus honey. The geographical distribution and characteristics of important honeys, and conditions and prospects for the future are also discussed.

Beekkeeping and the war, E. F. PHILLIPS (*Sci. Mo.*, 6 (1918), No. 5, pp. 444-449).

Transferring bees to modern hives, E. L. SECHRIST (*U. S. Dept. Agr., Farmers' Bul.* 961 (1918), pp. 14, figs. 5).—The methods by which bees may be transferred to hives with movable combs are here described. It is pointed out that probably one-third of all the bees in the United States are in hives without movable combs.

An unusual disease of honeybees, E. G. CARR (*Jour. Econ. Ent.*, 11 (1918), No. 4, pp. 347-351).—The author records an outbreak of a disease among colonies in Monmouth County, N. J., the symptoms of which are strikingly similar to those of Isle of Wight disease.

The natural enemies of *Chrysomphalus dictyospermi*, E. MALENOTT (*Bulletin* 13 (1917), No. 1, pp. 17-53, pls. 2; *abs. in Rec. Appl. Ent., Ser. A*, 6 (1918), No. 1, pp. 35, 36).—The greater part of this paper consists of descriptions of several chalcid parasites of *C. dictyospermi*, four of which are ectoparasitic and the others endoparasitic.

Casca luzonica n. sp., an endoparasitic parasite of *Schizaspis lobata*, E. MALENOTT (*Bulletin* 13 (1917), No. 1, pp. 73-76, figs. 6; *abs. in Rec. Appl. Ent., Ser. A*, 6 (1918), No. 1, p. 36).—A parasite of *S. lobata* infesting the leaves of *Ficus nota* on the island of Luzon, Philippines, is described as *C. luzonica* n. sp.

Some hymenopterous parasites of economic importance in southern Brazil, J. BRÉTHES (*An. Soc. Rural Argentina*, 52 (1918), No. 1, pp. 7-11, figs. 4).—The species here described are *Lytopilus melanocephalus* n. sp., parasitic on an undetermined lepidopterous larva which injures alfalfa and which may prove to be *Colias tesbia*; *Aphidius brasiliensis* n. sp., parasitic on plant lice; *Heptasimera brasiliensis* n. sp., which may prove to be a parasite of *Oncophanes heteroscapus ronnai* n. g. and n. sp., a parasite of an undetermined lepidopterous larva; and *Tetrastichus isis* n. sp., possibly a parasite of *Oncophanes*.

Sex determination and biology of a parasitic wasp, *Habrobracon brevicornis*, P. W. WHITING (*Biol. Bul. Mar. Biol. Lab. Woods Hole*, 34 (1918), No. 4, pp. 250-256, fig. 1).—The hymenopteran here considered is parasitic on the grown caterpillars of the Mediterranean flour moth.

On a braconid parasite of *Glossina*, R. E. TURNER (*Bul. Ent. Research*, 8 (1917), No. 2, p. 177).—A pupal parasite of *Glossina* is described as *Glossinophaga* n. sp.

Chalcidoidea bred from *Glossina* in the Northern Territories, Gold Coast, J. WATERSTON (*Bul. Ent. Research*, 8 (1917), No. 2, pp. 178, 179, fig. 1).—The species *Dirhinus inferus* n. sp., and *Chalcis ammorles* are recorded from *Glossina*.

New species of bees of the genus *Andrena*, from equatorial Africa, in the American Museum of Natural History, H. L. VIEBICK (*Bul. Amer. Mus. Nat. Hist.*, 37 (1917), pp. 235-239).

Contributions to our knowledge of the bee genus *Perdita*, H. L. VIEBICK (*Bul. Amer. Mus. Nat. Hist.*, 37 (1917), pp. 241, 242).

Notes regarding ticks found on farm animals in New Zealand, C. J. REAVES (*New Zeal. Agr.* [New Zeal.], 16 (1918), No. 2, pp. 83-86).—It is stated that the cattle tick has never been discovered in New Zealand and that tick fever has never occurred on the island. The two varieties of ticks found there are *Ixodes australis* and *Harmaphysalis* sp.

### FOODS—HUMAN NUTRITION.

Nutrition and clinical dietetics, H. S. CARTER, P. E. HOWE, and H. H. MASON (New York: Lea & Febiger, 1917, pp. XVI+646, figs. 63).—In this book the authors have brought together much material of value to students of nutrition. Part 1 is devoted to a discussion of foods and normal nutrition, part 2 deals with the chemical composition of foods, part 3 discusses the problems of feeding in infancy and childhood, and part 4 takes up feeding in disease. Much of the newer data from the literature of dietetics have been selected and assembled. Pathological factors of the diseases under discussion are given, also the effect of disease upon metabolism when enough is known to make such considerations profitable. No attempt has been made to go into the question of diet in special conditions, such as for the Army and Navy, hospitals, etc.

Food guide for war service at home (New York: Charles Scribner's Sons, 1918, pp. X+67, figs. 3).—This book has been prepared under the direction of the U. S. Food Administration in cooperation with the U. S. Department of Agriculture, and the U. S. Bureau of Education, and constitutes a simple statement of the food situation as affected by the war. It has been prepared with reference to use by elementary and high-school teachers, high-school students, and the general public in making "food education" general.

Today's food in war and peace ([Washington]: U. S. Food Admin., [1918], 1918).—Nine lessons, written by experts from the U. S. Food Administration and the U. S. Department of Agriculture are presented. The lessons have been prepared to help the woman in the home meet the food situation, but they are not only applicable for war time but for peace as well. The lessons include the following: Food and the War, by Herbert Hoover; Food for a Day, by E. V. McCollum; Wheat, Why to Save It and How to Use It, by A. E. Taylor; Conservation of Fats and Sugar, by E. V. McCollum; Meat and Meat Substitutes in War, by C. F. Langworthy; Milk and Its Products, by L. H. Mendel; Fruit and Vegetables, by Caroline L. Hunt; The Use of Locally-grown Products and Development of a Near-by Food Supply, by C. J. Brand; and The Children's Food, by Ruth Wheeler. The introduction was written by Ida M. Tarbell.

The civilian war ration, P. ROTH (*Jour. Amer. Med. Assoc.*, 71 (1918), No. 1, pp. 252, 253).—This article summarizes the results of a study, conducted at the direction of F. G. Benedict at the Nutrition Research Laboratory of the Carnegie Institution on the effects of a reduced diet on metabolism, physical fitness, and endurance. Students in normal health were submitted to a reduction of the daily food allowance sufficient to cause a rapid loss of body weight equivalent to approximately 10 per cent of the weight of the subject at the beginning of the experimental period. The food allowance was then increased and regulated to maintain this body weight for several months. The daily activities of the students were kept up, and numerous tests and observations relative to their metabolism, endurance, and general physical and mental efficiency were made.

It was found that after a 12 per cent loss in weight the net calories required to maintain this weight averaged about 2,300, or approximately one-third less than the original amount required. The actual heat output during sleep, as

computed by indirect calorimetry, was approximately one-fourth less than normal. The heat output per kilogram of body weight and per square meter of body surface was about 18 per cent lower than at the beginning of the study.

During the period of loss in weight and for some time after there was a loss of nitrogen amounting to approximately 150 gm. It is considered that there is an intimate relationship between this "surplus nitrogen" and the metabolic level, removal of this nitrogen evidently lowering the stimulus to metabolic activity. The nitrogen output per day was about 9 gm. as compared with an output of from 16 to 17 gm. in the case of the control squad on an unrestricted diet.

The pulse rate and blood pressure were distinctly lowered. With most of the men normal temperatures prevailed. The whole period of lowered food intake had no untoward effect on the physical or mental activities of the subjects.

The author concludes that no hesitancy should stand in the way of adopting for adult civilians war measures for food conservation that would result in enormous gains of supplies without endangering the efficiency of the civilian population. This reduction can safely include proteins as well as carbohydrates and fats.

**The fundamental requirements of energy for proper nutrition.** G. L. Key (*Jour. Amer. Med. Assoc.*, 70 (1918), No. 12, pp. 821-824, figs. 4).—This is a brief summary of the fundamental requirements of energy for the proper nutrition of boys from birth to 16 years of age, of soldiers at hard work, of men in industrial pursuits, and of women in industrial pursuits. The data given are classified as follows: "(1) Absolutely accurate—basal metabolism of all ages and sexes, and the increase in metabolism due to standing, walking, and carrying a load; (2) approximately accurate—metabolism in industrial pursuits; (3) hypothetical—metabolism of children during exercise."

The author points out that the values given are maximal values based on individuals in better than average nutritive condition and that it is possible to reduce somewhat the basal requirement of energy by undernutrition and to economize food without detriment to health.

**Figures and facts on feeding.** E. B. RACE (*Hotel World*, 86 (1918), No. 2, pp. 12, 13).—The steward of a dining room of a large normal school gives the results of a week's feeding. The amount of food calories that were served to the students, the kind of food, and the cost of serving it are recorded in tabular form.

**Welfare and housing.** J. E. HUTTON (*New York: Longmans, Green & Co.*, 1917, pp. VIII+192, pls. 8, figs. 2).—Three chapters of this book deal with food problems and give results of wartime experience in the feeding of munition workers at the Vickers factories (England). Details of management, sample menus, and comparative appetites of male and female workers are dealt with in the chapter on catering. The chapter on canteens gives details of structure, cost of equipment, and sample menus. The discussion of food values makes reference to the experimental and statistical data contributed by the U. S. Department of Agriculture.

**The diet of the negro mother in New York City.** A. F. HESS and L. J. UHL (*Jour. Amer. Med. Assoc.*, 70 (1918), No. 13, pp. 900-902).—This is a report of a dietary study of a group of negro mothers in a district of New York City in which rickets was prevalent.

The authors point out that most of the negroes in this district came from the West Indies, where their diet consisted mainly of vegetables and fruit, and that the sudden change to a diet in which meat is one of the principal ingredients, to the virtual exclusion of fruits and vegetables, may have so affected

metabolism of the mother and her offspring as to be one of the etiological factors in the production of rickets.

Food control in the United States (*U. S. Dept. Labor, Bur. Labor Statist., Mo. Labor Rev.*, 7 (1918), No. 2, pp. 137-140).—A statement of the measures for food control in the United States.

Food control in Great Britain (*U. S. Dept. Labor, Bur. Labor Statist., Mo. Labor Rev.*, 7 (1918), No. 1, pp. 84-94).—A brief summary of food control measures in Great Britain.

Food situation in England (*U. S. Dept. Labor, Bur. Labor Statist., Mo. Labor Rev.*, 7 (1918), No. 2, pp. 144-146).—A short discussion of food regulations in England.

Food control in France (*U. S. Dept. Labor, Bur. Labor Statist., Mo. Labor Rev.*, 7 (1918), No. 1, pp. 95-104).—A report of the food control measures in France.

War nutrition and public health in Germany, M. BLITSTEIN (*Vorwärts*, 1918, vol. 21; trans. in *U. S. Dept. Labor, Bur. Labor Statist., Mo. Labor Rev.*, 7 (1918), No. 2, pp. 148-151).—A short article on nutritive requirements, with special reference to the food situation in Germany.

The food supply of Russia, H. C. SHERMAN (*Polit. Sci. Quart.*, 33 (1918), No. 2, pp. 119-229).—It is shown that bread grains hold a predominant place in the Russian food situation. Wheat and rye are used interchangeably as bread grains, and most of the cultivated lands of Russia are devoted to the raising of cereals. It is popularly believed that an immense surplus of wheat is stored in Russia since the exportation of grain has ceased. The author points out, however, that owing to the increase in population, the diminution of acreage, abnormal economic conditions, and agrarian unrest, the 1917 crop was small at all in excess of Russia's needs for home consumption.

The oat crop of Russia is strictly devoted to horse feeding, but barley, buckwheat, maize, millet, rice, and sugar are staple crops. It would appear that decreased production due to the war has been compensated by decreased population, so that the amounts of these grains available for home consumption have not been decreased with the exception of sugar, the decreased supply of which is due to difficulty in refining.

The ratio of cattle to people in Russia is only about half as great as in the United States. Roughly estimated, the amount of beef produced and consumed in Russia averages for the entire population about 20 lbs., of mutton about 7 lbs., of pork about 6 lbs., and of fish about 9.3 lbs. per capita per year. Eggs and eggs at the present time are negligible factors of the food supply.

Of the fruit and vegetable crops the only ones regularly included in the food statistics for the country as a whole are potatoes, beans, peas, and corn, an average of 370 lbs. of potatoes and 17 lbs. of dried legumes being consumed per person per year.

Beets, cabbage, cucumbers, and onions are used in quantity. The cucumber holds a very important place in the Russian dietary, an average of 100 lbs. being consumed yearly per person. Russia produces many kinds of fruits and berries, which are consumed locally.

Although the peasants in some localities seem to make use of milk as a part of their daily food, Russia as a whole does not have a sufficient milk supply, the estimate per capita being about 55 lbs. per year.

The author summarizes data as to the adequacy of the Russian food supply as follows: "While it seems certain that under present conditions Russia has no very large surplus of food, yet her supply appears sufficient for her own needs as regards calories and ample as regards protein, phosphorus,

and iron. The estimated calcium content, however, is undesirably low, as is usually the case in communities having a low per-capita milk supply. The Russian diet appears to consist too largely of bread and other grain products and too little of milk, vegetables, and fruit, to be well proportioned. In the United States, according to Kellogg and Taylor, bread furnishes 31 per cent and all grain products 41 per cent of the total calories of the food supply. In France, which shows the largest dependence upon bread of any of the countries considered by these authors, bread furnishes 53 per cent and grain products 58 per cent of the total calories. In Russia, if the above estimates are approximately correct, bread furnishes 59 per cent and all grain products provide 65 per cent of the total calories of the food. A large amount of milk and vegetables would certainly improve the character of the diet, from the standpoint of the modern chemistry of nutrition, and would in all probability greatly reduce the death rate of Russia's children and the suffering among the adults of the northern parts of the country."

**Milk as a source of water-soluble vitamin.** T. B. OSBORNE, L. B. MEXTER, and A. L. (Jour. Biol. Chem., 34 (1918), No. 3, pp. 537-551, figs. 3; abs. in Chem. Abs., 12 (1918), No. 16, p. 1677).—The authors discuss the discrepancies in the quantitative relations in the amounts of milk required to furnish the vitamin factors in their own experiments in contrast with those of Hopkins, previously cited (E. S. R., 28, p. 230). Further experiments on the use of dried whole milk, of equivalent amounts of protein-free milk, and of fresh milk are reported and are in agreement with the earlier results on protein-free milk, a much larger amount being necessary to produce a normal rate of growth than was reported by Hopkins.

While unable to explain this difference, the authors state that it seems advisable for the present to use a liberal amount of milk when this is necessary, upon to supply any considerable proportion of the water-soluble vitamin. The possibility is pointed out of a deficiency in this factor in infant food-formulae. Milk modified by diluting top milk and adding sugar if for any reason the infant becomes less than normal.

**The use of Neufchâtel and cream cheese in the diet.** K. J. MAYNARD and F. R. CAMMACK (U. S. Dept. Agr. Bul. 969 (1918), pp. 24-35, figs. 12).—A discussion of the nutritive value of Neufchâtel and cream cheese with respect to their combination with other foods in cookery.

**The food value of eulachon.** M. R. DAUGHTERS (Jour. Biol. Chem., 35 (1919), No. 2, pp. 267-299).—The following analysis is reported of the eulachon, a species of marine fish related to the smelt and found along the Pacific coast from Oregon to Alaska: As purchased, moisture 76.75, protein (N X 6.25) 12.22, ether extract 9.82, and ash 1.56 per cent; edible portion, moisture 74.67, protein 13.18, ether extract 11.21, and ash 1.4 per cent. Tables are also included showing the composition of the aqueous extract and the analytical constants of the fish.

In food value the eulachon is deemed equal to the salmon and in flavor is considered superior. See also a previous note (E. S. R., 38, p. 468).

**Commercial stocks of fish** (U. S. Dept. Agr., Food Surveys, 1 (1918), No. 7, pp. 8, figs. 12).—A report of the stocks of fish on hand January 1, 1918.

**Commercial stocks of canned goods** (U. S. Dept. Agr., Food Surveys, 1 (1918), No. 11, pp. 32, figs. 44).—"The commercial stocks of canned goods covered by the war emergency food survey of January 1, 1918, for which information is here presented, include meats, soup, salmon, sardines, tomatoes, corn, peas, lentils, beans, miscellaneous canned vegetables, fruits and berries, and preserves, marmalades, jellies, crushed fruits, and fruit sirups."

**Digestibility of some seed oils.** A. D. HOLMES (*U. S. Dept. Agr. Bul.* 687 (1918), pp. 20).—Continuing previous work with fats (E. S. R., 38, p. 867), the digestibility of certain seed oils was tested by feeding experiments in mixed diet made with human subjects. The results of these experiments are recorded. An average of 82 gm. of corn oil, 80 gm. soy-bean oil, 90 gm. sunflower seed oil, 70 gm. Japanese mustard-seed oil, 82 gm. rapeseed oil, and 58 gm. charlock oil was consumed per person per day. The coefficients of digestibility for these oils were found to be 96.8, 97.5, 96.5, 98.8, 98.9, and 98.9 per cent, respectively. The oils apparently exerted no unusual effect on the digestibility of the carbohydrates in the diet, consisting largely of starch.

Considering the results of the digestion experiments as a whole, it is evident that corn, soy-bean, sunflower-seed, mustard-seed, rapeseed, and charlock-seed oils are well assimilated and, judged by their digestibility, should prove satisfactory sources of fat for the dietary."

**The velvet-stemmed Collybia—a wild winter mushroom.** F. C. STEWART (*New York State Sta. Bul.* 448 (1918), pp. 79-98, pls. 11).—A detailed description is given of this edible mushroom, *Collybia velutipes*, to make certain its identification. Its economic use as food is discussed, and several methods of cooking are described. Tests showing the remarkable capacity of the species for absorption of water are briefly noted.

**Sugar substitutes in jelly making.** LEONORE DUNNIGAN (*Amer. Food Jour.*, 17 (1918), No. 5, pp. 247, 248, figs. 4).—Results are reported of the use of honey, glucose, fructose, corn sirup, molasses, and sorghum sirup as substitutes for sugar in jelly making with cranberries and apples. Excellent results were obtained with honey and light corn sirup. The flavor was not so good with dark corn sirup, sorghum, and molasses, but the texture was about the same.

The author advocates a marked decrease in the amount of sugar used in jelly making and the extensive use of sugar substitutes. A list of practical formulas on jelly making is included.

**Vegetable foods for the diabetic.** RUTH A. WARBALL (*Jour. Amer. Med. Assoc.*, 6 (1917), No. 22, pp. 1859-1862).—Experiments are reported on the effectiveness of different methods of extracting carbohydrates from vegetables to render them suitable for the diet of the diabetic. Tables are given of the results of repeated boiling water extraction and of the comparative results of extractions at boiling temperature and at 60° C.

The data show that repeated water extraction is more effective in removing carbohydrates from some foods than from others. In the vegetables tested Brussels sprouts and cauliflower proved most resistant to extraction. Extraction at 60° proved as efficacious as at higher temperatures in most cases, excepting a notable exception. The carbohydrate of the carrot and beet can be very readily extracted at this temperature.

**Experimental studies on creatin and creatinin.**—VIII. The alleged exogenous origin of urinary creatin in the protein of the diet. W. C. ROSE, J. S. DUNNIGAN, and H. L. BARTLETT (*Jour. Biol. Chem.*, 34 (1918), No. 3, pp. 691-612; *abs.* *Chem. Abs.*, 12 (1918), No. 16, p. 1657).—In continuation of earlier work (E. S. R., 35, p. 665) the authors have summarized existing theories in explanation of the presence of creatin in the urine and have reported further studies on the influence of high protein diets upon the creatin-creatinin metabolism of normal men and women. The plan of the experiments was to study the output of creatin, creatinin, and total nitrogen following the ingestion of diets alternately low and high in protein content and free from creatin and creatinin. Most of the protein was taken in the form of eggs, milk, and cheese.

Contrary to the findings of Davis and Minot (E. S. R., 37, p. 162) the ingestion of diets excessively high in protein failed to induce the excretion of creatin

in normal men and women. Diets yielding from 3,400 to 3,900 calories per day, whether accompanied by a moderate (13 gm.) or large (27 gm.) nitrogen intake, appeared to exert no appreciable influence upon creatin-creatinin metabolism. It is the opinion of the authors that "no evidence has yet been adduced sufficient to justify the acceptance of a theory which postulates an exogenous origin of urinary creatin in the absence of creatin in the diet."

**Proteose intoxications and injury of body protein, III-V** (*Jour. Expt. Med.*, 28 (1918), No. 2, pp. 213-252).—Three papers are reported in continuation of investigations previously noted (*E. S. R.*, 37, p. 167).

**III. Toxic protein catabolism and its influence upon the nonprotein nitrogen partition of the blood**, G. H. Whipple and D. D. Van Slyke.—Experimental evidence is given indicating that "the acute intoxication following an injection of a toxic proteose is usually associated with a large increase (40 per cent or more) in the nonprotein nitrogen of the blood. This increase is found chiefly in the blood urea nitrogen, but the amino and peptid nitrogens also may show small increases. The changes observed in the blood nonprotein nitrogen are identical with those which follow the feeding of large amounts of meat."

"These facts indicate that the proteose intoxication causes an abnormally rapid autodigestion of tissue proteins, but that the nitrogenous end-products are, in chief part at least, the same that result from normal catabolism of food proteins. There is no evidence that the autolytic products play any part in causing the intoxication. The possibility of such a part and a resultant vicious circle is not excluded, but from the available facts the autolysis appears more as a result rather than cause of the intoxication. It appears possible that the disease or intoxication tissue catabolism may be enormously accelerated and yet yield the end-products of normal protein metabolism."

**IV. The metabolism of dogs with sterile abscess, pancreatitis, and pleurisy**, J. V. Cooke and G. H. Whipple.—Experiments are reported showing that suppurative processes or acute inflammation due to a chemical irritant give the same increased output of urinary nitrogen as does the same inflammatory reaction when caused by some specific bacterial agent. It is considered that the increase can not be explained entirely by a local destruction of tissue with the elimination of the nitrogen derived from these destroyed cells, but is due to the formation of toxic split products in the abscessed area which are absorbed and cause a general intoxication, cell injury, and resultant nitrogen increase.

The conclusion is drawn that a great part at least of the reaction in septic inflammation is nonspecific and results from the primary injury of the host's protein and cell autolysis.

**V. The increase in nonprotein nitrogen of the blood in acute inflammatory processes and acute intoxications**, J. V. Cooke and G. H. Whipple.—Both sterile abscess formation and septic inflammation in the dog produce a distinct rise in the nonprotein nitrogen in the blood. Many acute infections in man (septicemia, peritonitis, pneumonia, etc.) and certain obscure intoxications show a definite rise in the nonprotein nitrogen and urea nitrogen. In order to explain this retention of protein split products in the body cells and fluids during these intoxications, the authors consider it necessary to determine whether the kidneys' eliminative function for nitrogenous substances is in any way impaired in acute proteose intoxication or other intoxications.

**The present status of our knowledge of fatigue products**, E. L. Scott (*Health Rpts. [U. S.], 33 (1918), No. 17, pp. 605-611*).—"Substances carrying hydrogen ions, as lactic,  $\beta$ -oxybutyric acids, potassium, dihydrogen phosphate and carbon dioxide, stand as causal agents of fatigue. Certain products of protein disintegration, as indol, skatol, and phenol, may produce fatigue symptoms."

and may be active agents in producing normal fatigue. There is some evidence that the negative ion of lactic and  $\beta$ -oxybutyric acids and that certain positive ions, especially that of potassium, are capable of producing certain fatigue phenomena. There is no evidence that the negative ions of carbonic, phosphoric, or sulphuric acids are fatigue substances. There is no evidence at present for the existence of specific fatigue substances as proposed by Weickhardt. There is very little probability that creatin or creatinin have any relation to fatigue or to muscle work in general. There are no doubt numerous bodies, as purin bases, uric acid, etc., which may be increased by work, but which have no causal bearing on fatigue."

### ANIMAL PRODUCTION.

Genetics.—The rôle of selection in evolution, W. E. CASTLE (*Jour. Wash. Acad. Sci.*, 7 (1917), No. 12, pp. 369-387).—A brief review is presented of the work of Darwin, De Vries, Johannsen, Morgan, Pearl, and others in an effort to demonstrate the rôle of selection in evolution.

The author holds that many biologists at the present time regard selection as an absolute agency in evolution, and look to mutations and pure lines only for its explanation. Selection and mutation are defined in the light of the work of the investigators named, and the contrasted ideas of Darwin and De Vries outlined. It is maintained that the conclusion reached will depend largely upon the sort of evidence studied, and that paleontology, geographical distribution, classification, and experimental breeding all present evidence which must be weighed before the verdict can be framed.

The attempts to generalize Johannsen's demonstrations of the pure-line principles are discussed, and the work of Pearl with Plymouth Rock fowls, of Morgan with *Drosophila*, of the author with guinea pigs, and of other workers with plants and animals is cited. The conclusion is drawn that the applicability of the pure-line theory in the breeding of animals and plants depends upon how common stable and plastic genes, respectively, prove to be and in what sorts of variations they are involved. "Aside from color," says the author, "there are very few valued economic characters in our domestic animals which are not affected after the manner of blends." With regard to plants it is asserted that the applicability of the pure-lined principle, outside of those plants that are normally self-fertilized, is very limited, as demonstrated by experiments with corn in progress at the University of Illinois (E. S. R., 20, p. 531). Owing to the fact that in these experiments corn of unprecedentedly high protein and oil content has been obtained, it is held that selection has been the cause of further evolution in the direction of selection, and hence an agency in the progressive evolution of a new type.

"Selection, whether natural or artificial, is, as the mutation theory rightly holds, primarily an agency for the elimination of variations, not for their production. It can only act on variations actually existing, and while it can, I believe, continue and extend variation already initiated by shifting in the direction of selection the center of gravity of variation, it can not initiate new lines of variation. It can not change a vertebrate into something else, nor something else into a vertebrate. It is limited to the modification of existing types of organisms, and to their modification in directions in which they show a tendency spontaneously to vary."

The share of egg and sperm in heredity, E. G. CONKLIN (*Proc. Nat. Acad. Sci.*, 3 (1917), No. 2, pp. 101-105).—The fact that the distribution of chromosomes in maturation, fertilization, and cleavage is parallel to the distribution of Mendelian factors has led many students of heredity to regard the cytoplasm



of the germ cells as of no importance in heredity. The highly differentiated cytoplasm of the spermatozoon is either left outside the egg when its nucleus enters or it undergoes a differentiation within the egg; at the same time the egg cytoplasm ceases to form yolk, while the yolk which has been formed is gradually used up in the nourishment of the embryo. Symmetry, asymmetry, and polarity in the adult are derived from the egg and not from the sperm. Thus the fundamental pattern of egg cytoplasm is not influenced by the spermatozoon, as is indicated by the following facts: (1) It exists before fertilization or it appears so soon after that it could not have been caused by the sperm. (2) In heterogeneous fertilization the pattern of the egg is not changed by the foreign sperm. (3) Natural or artificial parthenogenesis demonstrates that this pattern exists in the absence of fertilization.

The cytoplasm of the egg is the more or less differentiated body of the embryo. Whenever a character as such is transmitted through the egg cytoplasm and not as factors in the chromosomes of egg and sperm it is not inherited in Mendelian fashion. In each generation the egg contributes more than the sperm to ontogeny. There is cytoplasmic inheritance through the female only, but these cytoplasmic characters are themselves of biparental origin. This is Mendelian inheritance, though somewhat complicated by the fact that every ontogeny has its beginning in the preceding generation.

**The collocation of plasmas within the cell, I-II.** L. LEGRAND (*Rev. Gen. Sci.* 28 (1917), No. 12, pp. 368-376; 13, pp. 396-403, figs. 24; *Sci. Amer. Suppl.* 5 (1918), Nos. 2195, pp. 60-64; 2196, pp. 76, 77, figs. 24).—The author attempts by means of diagrammatic figures to represent the structure of the substances which have come to be spoken of as the factors in heredity. Upon these figures a mechanical theory of heredity is advanced.

The constructive hypothesis of the theory rests essentially upon an interpretation of the longitudinal segmentation of the chromosomes which distributes equally between the two daughter cells the chromatin of the mother nucleus. To this concept is added the "very exactly symmetrical arrangement of the spindle with its conductor threads imposing a prepared trajectory upon each chromosomal segment, since it is of supreme importance that certain geometrical relations once established should not be modified in the course of the transfer of the chromosomes; the regularity of situation of each chromatic loop presenting its summit very exactly toward the axis of the spindle and its outward diverging branches, and its impulse along the directive filamentary system toward the attractive pole, following a movement which is very symmetrical with relation to its congener; finally the preservation of the connective filaments undisturbed the twin loops during all the phases of the kinesis."

The present theory limits the power of karyokinesis in the transmission of characters in the soma to the three types of nonfixed plasmas (fixed neither to each other nor to the cytoplasmic block), to the exclusion of the specific plasma which is abundant in the healthy animal and during growth. It seeks to establish that all the precision of the successive phases of the kinesis tends to maintain in the daughter cells the arrangement and mode of fixation between them, and with the surrounding specific plasma of the various masses of nonfixed plasmas in the position in which they are found after the original amphimixis. It is the interactions of the nucleus and cytoplasm, their zones and their modes of contact, of attraction, and of fixation, which constitute life. "The specific plasma being of maternal origin or of actual digestive synthesis, and the non-fixed plasmas reconstituting themselves approximately in substance and in mode of fixation, in form and in substance, until the cessation of the formative cytodiereses, we perceive that in the fecundated ovule everything is provided for the building up of a new organism."

**Sex determination and sex differentiation** in mammals, F. R. LILLIE (*Proc. Nat. Acad. Sci.*, 3 (1917), No. 7, pp. 464-479).—The author points out the possibility for complete reversal of the indicated "sex" differentiation in mammals. Sexzygotic sex determination has taken place and discusses in its bearing on the question the development of the female or freemartin of two-sexed twins (Lillie (E. S. R., 35, p. 169)). It is contended "on the basis of the present facts that sex determination in mammals is not irreversible predestination, and that with known methods and principles of physiology we can investigate a possible range of reversibility."

**The control of the sex ratio**, O. RIDDLE (*Jour. Wash. Acad. Sci.*, 7 (1917), No. 1, pp. 349-356, fig. 1).—An outline is given of experimental attempts that have been made to learn the nature of sex and to control the sex ratio and the development of sex. Hybridization experiments by the author and others with pigeons and pigeons and other forms are reviewed, from which it is noted that as the "width of the cross" is increased a relatively higher proportion of males is produced. From these and other investigations the author concludes that the male sex is an expression of metabolism at a higher level, and the female sex of a metabolism at a lower or more conservative level. Reviewing again the composition of the yolk of pigeons' eggs (E. S. R., 37, p. 772), the author concludes that the sex actually realized corresponds in fact to the levels of grades of metabolism, and notes that the measured metabolism "was completed before the beginning of maturation, so that if such a differential maturation should occur it must be looked upon not as a cause but rather as a result of the establishment of that grade of metabolism which does here and under the several known conditions in the clearest way accompany and correlate of each particular sex."

Summing up the work with pigeons, it is noted that sex and such characters as fertility and developmental energy not only bear initial relations to the sex of the egg in the clutch, but that sex and these other characters are progressively modified under stress of reproductive overwork, until at the extreme end of the season certain aspects of femininity are abnormally or unusually accentuated. Sex is therefore considered a quantitative modifiable character.

The article closes with a brief survey of some experimentally induced and of the sex ratios, of facts of sex that have been shown by studies of embryonic and postnatal stages of organisms, and of the effects of castration, gonad transplantation, and gonad-extract injection. A list of cited literature is given.

**Uses of velvet beans as feed**, S. M. TRACY and H. S. COE (*U. S. Dept. Agr., Bur. of Ent. and Pl. Ind.* (1918), pp. 36-38, 38, 39).—Notes are given on the composition of velvet beans and velvet bean meal, and feeding experiments by various State Experiment stations to determine the value of velvet beans as feed for steers, dairy cows, and pigs are reviewed. These experiments for the most part show the value of velvet beans as compared with cottonseed meal.

Some unpublished experiments on feeding velvet beans by a number of southern stations are briefly reviewed by D. W. May. At the Tennessee Station 5 lbs. of velvet bean meal was hardly equal to 6 lbs. of cottonseed meal for dairy cattle. The cattle readily ate the rations containing velvet bean meal. In two tests at the Florida Station rations containing velvet bean meal produced milk more deeply than those containing cottonseed meal. The Tennessee Station found that when velvet beans in pod composed more than one-third of the ration they were unpalatable for hogs. Pigs gained 0.916 lb. daily and required 56 lbs. of feed per pound of gain at the South Carolina Station on a ration of velvet bean meal and corn meal (2:1), while those fed soy bean meal and corn meal (2:1) gained 0.548 lb. per day and required 7.24 lbs. of feed per pound of gain.

**Feeding and grazing steers, A. P. KERR** (*Louisiana Stat. Rpt. 1917*, p. 13).—Palm kernel meal was compared with peanut meal as a supplement to Japanese cane silage, two lots of 10 steers each being fed for 90 days. Those on palm kernel meal gained an average of 1.55 lbs. per head daily, and those on peanut meal 1.19 lbs. The steers grazing on corn and velvet beans in November and December failed to make satisfactory gains.

**Fertilizing constituents excreted by two-year-old steers, H. S. GRAY, W. MUMFORD, A. D. EMMETT, and S. BULL** (*Illinois Sta. Bul. 299 (1918)*, pp. 162; *abs.*, pp. 8).—This bulletin gives results of a study of the amounts of nitrogen, phosphorus, and organic matter excreted by steers, whether these are excreted via the feces or the urine, and the commercial value of the fertilizing elements of the excreta. No bedding was used in the experiments, and its fertilizing value is not considered. The 8 Hereford steers used during the 7 weeks of the experiment were fed in digestion and metabolism stalls, and rations and feed consumption of the four lots have already been noted (*Ill. Sta. Bul. 37*, p. 471). The average daily gains per steer were 0.76 for the maintenance, 1.28 lbs. for the one-third feed lot, 1.76 lbs. for the two-thirds feed lot, and 2.12 lbs. for the full-feed lot.

The following table shows the amount of organic matter, nitrogen, and phosphorus excreted, expressed in percentage of the amount consumed:

*Excretion of organic matter, nitrogen, and phosphorus by steers.*

Period.	Weeks.	Ratio of hay to corn to linseed meal.	Organic matter in feces.	Nitrogen.		
				Total.	Proportion in feces.	Proportion in urine.
1.....	1-5	1:1.0	<i>Per cent.</i> 33.30	<i>Per cent.</i> 81.82	<i>Per cent.</i> 68.53	<i>Per cent.</i> 31.47
2.....	6-13	1:3.0	27.89	86.33	68.68	41.72
3.....	17-22	1:5.0	24.24	86.72	56.18	43.84
4.....	23-30	1:4.1	21.85	89.97	35.96	64.94
5.....	34-37	1:4.1	22.75	92.56	35.25	64.75
Total.....	1-37		26.24	87.40	49.82	50.18

<sup>1</sup> Omitting 1 steer.

Practically all the phosphorus excreted was in the feces, except in the case of one steer excluded from the table, whose urine contained 20 times as much phosphorus as the urine of some of the other steers.

The amount of feed consumed had no influence upon the percentages of organic matter and phosphorus excreted. This was also true of the organic matter excreted, except in period 1 and possibly period 2.

Slightly more organic matter was recovered in the manure than would have been recovered in a system of farming in which the corn is sold and the clover plowed under. When linseed meal was introduced into the ration, 100 per cent as much nitrogen and 141 per cent as much phosphorus was excreted as was contained in the farm-grown feeds.

Valuing nitrogen at 15 cts., phosphorus at 10 cts., and potassium at 6 cts. and assuming that 90 per cent of the potassium consumed was excreted, the commercial value of the manure was 36 per cent of the cost of the feed in period 1, 27 per cent in period 2, 24 per cent in period 3, 32 per cent in period 4, 29 per cent in period 5, and 29 per cent in the entire experiment.

**Helpful hints to hog raisers, C. M. VESTAL** (*California Sta. Circ. 201 (1918)*, pp. 7).—A few pointers are suggested for the purpose of stimulating interest

giving aid to those engaged in raising hogs. A gestation calendar for sows compiled.

Hog grazing crops, A. P. KERR (*Louisiana Sta. Rpt. 1917, p. 13*).—Hogs fed peanut meal, from which the oil had been extracted, on dry lot produced lower gains than those fed palm kernel meal, but the peanut meal ration resulted in softer meat than the palm kernel meal ration. Both the above rations were balanced with corn chop.

Hogs grazing on corn and velvet beans refused to eat the immature beans, but by the time the beans were dry and palatable the corn had been consumed. The hogs made fairly good gains.

A simple hog-breeding crate, J. H. ZELLER (*U. S. Dept. Agr., Farmer's Bul. 1518, pp. 4, fig. 1*).—Brief directions are given for the construction and operation of a hog-breeding crate.

Mineral content of southern poultry feeds and mineral requirements of growing fowls, B. F. KAUFF (*Jour. Agr. Research [U. S.], 14 (1918), No. 3, pp. 1-16, pl. 1*).—This is a report of work done at the North Carolina Experiment station upon the mineral matter required in the production of broilers. The investigation attempted to ascertain (1) the amount of mineral per unit in the bones of the baby chick and of the 1.5-lb. broiler; (2) the mineral content of the southern poultry feeds; (3) a proper feed mixture from the standpoint of protein, carbohydrate, and fat; (4) the mineral content of this mixture; and (5) by feeding, whether the minerals of the feed mixtures were in sufficient quantities for the greatest rate of growth possible. Tabulated data show the mineral content of the bodies of the fowls, the mineral content of the feeds fed, and the mineral intake, output, and balance of the chicks by periods during the experiment.

It was found that the mineral content of southern poultry feeds varies in different kinds of feed and in different lots of the same kind. This difference is influenced by weather conditions, such as drought, and by the different mineral contents of the soil.

To produce 1 gm. of gain in weight required 7.49 gm. of milk, 2.91 gm. of fish and grain, and 1 gm. of green feed. An average of 75.2 per cent of the carbohydrates and 80.2 per cent of the fat was digested by the chicks.

The results indicate that to supply the proper amount of phosphorus, magnesium, and calcium to growing chicks in mash consisting of such mill feeds as middlings and ground oats there should be added meat and bone meal, or fish meal, or meat meal. Sour skim milk and buttermilk, if given in sufficient quantities, aid in making good the mineral shortages as well as providing feed hormones.

Cost of raising cockerels for broilers, G. R. SHOUP (*Washington Sta., West. Bul. Sta. Mo. Bul., 6 (1918), No. 4, pp. 55-57*).—In this experiment 100 supposed cockerels were selected from a room-brooder flock of 4-week-old chicks. At this time they weighed an average of 6.32 oz. Five of the chicks died and were turned out to be pullets. The 95 were fed to the end of the ninth week, and the 50 cockerels were then crate-fattened for 10 days and marketed. The rations consisted of sprouted oats, dry mash, scratch feed, and milk.

The 50 birds weighed 96 lbs. at market, and the cost of feed for the 95, including heat but not labor and overhead expenses, was \$16.55. The receipts for express were \$28.04. From this test it is estimated that the cost of day-old chicks is about 15 cts.; raising to four weeks, 15 cts.; and four weeks to market age, 17.5 cents; making the cost of raising broilers about 47.5 cts. per bird.

Meat scrap and sour milk for egg production, H. L. KEMPSTER and G. W. BERRY (*Missouri Sta. Bul. 155 (1918), pp. 3-16, figs. 4*).—That part of this

bulletin reporting results of feeding meat scrap and sour milk and gluten meal, gluten meal, and cottonseed meal for egg production, is a reprint Circular 82, already noted (E. S. R., 37, p. 774).

A further series of tests was conducted from November 1, 1916, to October 3, 1917, in which meat scrap, cottonseed meal, and gluten meal, alone and in combinations, supplied the basal protein. Ten lots of 10 White Leghorns were used. In addition to the protein, the birds were fed a mash of 10 parts by weight of bran, shorts, and corn meal. Lot 10 received the mash alone. The amount of protein-fed lots 1 to 9 was the same. The following table shows some of the results obtained:

*Results of tests of protein feeds alone and in combination for laying hens.*

Lot.	Source of basal protein.	Eggs laid per hen.	Feed required per pound of eggs.	Eggs per pound of feed.
			Pounds.	
1	Meat scrap.....	134.7	4.2	24.0
2	Meat scrap, cottonseed meal (2:1).....	127.5	4.1	24.4
3	Meat scrap, cottonseed meal (1:2).....	97.9	5.2	19.2
4	Cottonseed meal.....	59.6	8.5	11.8
5	Cottonseed meal plus 5 per cent bone ash.....	83.4	6.4	15.6
6	Meat scrap, gluten meal (2:1).....	103.8	4.9	20.4
7	Meat scrap, gluten meal (1:2).....	115.2	4.6	21.7
8	Gluten meal.....	58.8	9.2	10.9
9	Gluten meal plus 5 per cent bone ash.....	92.9	5.4	18.5
10	Check pen.....	63.7	7.8	12.8

### DAIRY FARMING—DAIRYING.

**Clover v. alfalfa for milk production.** C. C. HAYDEN (*Ohio Sta. Bul.* (1918), pp. 3-36).—A series of four experiments covering a period of four years and involving 36 cows is reported. Alfalfa and clover were fed alternately to each lot, and the feeding periods were made as long as possible. Excess of the hays, the rations were identical, and consisted of ground corn and silage in the first and fourth tests, and ground corn, wheat bran, corn silage, and corn stover in the second and third tests. The clover hay in the first test was not of good quality.

Some of the results obtained are set forth in the following table:

*Clover v. alfalfa for milk cows.*

Test.	Production.		Feed consumed.					
	Milk.	Fat.	Corn.	Bran.	Silage.	Stover.	Clover.	
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	
Clover periods:								
First.....	8,779.4	340.7	3,068.0		11,334.0		4,908.0	
Second.....	9,290.0	402.4	2,185.0	1,092.5	10,746.0	1,190.5	3,411.5	
Third.....	5,561.8	243.5	1,381.2	690.6	6,952.8	838.2	2,271.0	
Fourth.....	7,704.0	292.2	2,137.5		8,526.0		4,258.0	
Total.....	31,335.2	1,278.8	8,771.7	1,783.1	37,558.8	2,028.7	14,878.5	
Alfalfa periods:								
First.....	10,832.7	412.2	3,301.5		12,747.4			
Second.....	10,315.6	438.3	2,521.0	1,260.5	12,435.6	1,334.4		
Third.....	5,578.4	240.7	1,411.2	705.6	7,045.3	901.5		
Fourth.....	7,543.6	293.1	2,137.0		8,536.0			
Total.....	34,271.3	1,374.3	9,370.7	1,966.1	40,784.5	2,235.9		

The alfalfa rations contained 31.8 per cent more protein than the clover rations and 8.2 per cent more carbohydrates and fat, but the cows on alfalfa produced only about 9.5 per cent more milk. The average nutritive ratio during the four tests was 1:8.6 for the clover rations and 1:7 for the alfalfa rations.

In test I the cows on clover lost in weight about 1 lb. daily in both periods, while those on alfalfa gained about 0.7 lb. daily in both periods. In test II the cows on clover lost about 0.7 lb. daily, while those on alfalfa gained in the first period and lost in the second period with an average loss of about 0.1 lb. daily. In test III the cows on clover lost during the first period and gained about an equal amount during the second period, while those on alfalfa gained during the first period and lost about an equal amount during the second period. In test IV both lots lost slightly in the first period and gained slightly in the second period. The nutrients consumed per 100 lbs. of milk were for the clover periods 7.86 lbs. of protein and 67.9 lbs. of carbohydrates (plus 2.25 times the fat). The corresponding amounts for the alfalfa periods were 9.39 and 67.49 lbs., respectively.

The results of these tests indicate that a unit of clover protein is more efficient in milk production than a unit of alfalfa protein.

The milk and fat production and feed consumption of the individual cows in the experiment are summarized in tabular form in the appendix.

**Correlation between the percentage of fat in cow's milk and the yield.** E. HERRIS (*Jour. Agr. Research* [U. S.], 14 (1918), No. 2, pp. 67-100, figs. 2). In his investigation, which was made by the laboratory of genetics of the Illinois Experiment Station, the data were for the most part obtained from the registers of the different American dairy cattle associations. Only the yearly tests were used. The relation between the percentage of fat and the yield of milk was obtained by means of the correlation table. The cows are grouped, according to age when the test began, into the following classes: Two to 3 years, 3 to 4 years, 4 to 5 years, and 5 years and over.

It is concluded that "a significant negative correlation exists between the percentage of fat in cow's milk and the yield for the Jerseys, Guernseys, Holstein-Friesians, grade Jerseys, grade Holstein-Friesians, and cows unclassified as to breed. The correlation for Ayrshires is not significant in the subgroups based in respect to age, but it is significant when these groups are treated as a whole.

"The yield of milk increases with age. However, since all cows 5 years of age and over are clasped together, it may well be that the yield decreases at the period beyond 5 years. . . . In the Jerseys, Guernseys, and Holstein-Friesians the percentage of fat remains fairly constant for the different ages tested. However, the group 5 years of age and over in the Jerseys and Guernseys shows a slightly lower percentage of fat than the younger groups. In the case of the Ayrshires there is a gradual decrease with age. Between the youngest and oldest groups there is a difference of 0.151 per cent. When judged by standard deviation age has no influence on the variability of the percentage of butter fat. But the class 5 years of age and over is more variable in the yield of milk than the younger groups. This may occur because of the inclusion in this group of old cows whose milk yield has decreased.

"The breed has an influence on the variability of milk yield and percentage of fat, using the standard deviation as a basis of comparison. For variability of yield the breeds stand in the following order in an ascending scale: Jersey, Ayrshire, and Guernsey practically the same, Holstein-Friesian. For percentage of fat the order is: Holstein-Friesian and Ayrshire about the same, Guernsey, Jersey. For the production of milk the breeds stand as follows: Holstein-Friesian 14,443.1, Ayrshire 9,471.1, Guernsey 8,614.4, and Jersey 7,491.4 lbs.

The average percentages of fat for the different breeds are as follows: Jersey 5.392, Guernsey 5.033, Ayrshire 3.533, and Holstein-Friesian 3.435 per cent.

**Hemolytic substances in heated milk and in milk cultures of *Bacterium welchii*.** W. W. FORD and J. H. LAWRENCE (*Bul. Johns Hopkins Hosp.*, 28 (1918), No. 318, pp. 245-249).—An investigation of the hemolytic action of the way from decomposed milk and from pure milk cultures of *B. welchii* is reported.

Samples of Baltimore market milk heated to 85° C. for 15 to 20 minutes and incubated at 22° or at 37° for 24 to 48 hours exploded violently with or without a subsequent peptonization. The fluid from such decomposed milk after peptonization had hemolytic properties.

"The hemolysis of this milk is independent of the acids in the milk, occurring in neutralized specimens; is thermostable, being destroyed at temperatures between 55 and 60°; is precipitable by ethyl alcohol; and can be digested by pepsin and pancreatin. It is to be classed with the bacterial hemolysins and is in all probability to be attributed to the presence of *B. welchii* in the market milk. Pure milk cultures of *B. welchii* contain a similar hemolysin, which is, however, usually slightly more powerful. This also is independent of the acids in the milk; is thermostable, being destroyed at temperatures between 55 and 60°; is precipitable by ethyl alcohol; and can be digested by pepsin and pancreatin."

The results thus far secured indicate that this hemolysin is a true bacterial hemolysin and distinct from that of both lactic acid and butyric acid. The rôle of these acids in the hemolysis noted in cultures of *B. welchii* is therefore to be secondary to that of the true bacterial hemolysin secreted by the organism.

**A plan for controlling the milk supply of the small town.** P. WERNER (*Jour. Dairy Sci.*, 1 (1917), No. 3, pp. 284-289).—In connection with a sanitary survey of the milk supply of St. Charles, Mo., by the Missouri Experiment Station a series of direct microscopic counts of bacteria was made of milk samples preserved in formalin. These counts, made from milk from two to five days old checked so perfectly with the counts from fresh milk that additional experiments were planned to determine the possibility of making the counts from preserved samples at a central laboratory instead of in the field.

In order to determine whether the addition of formalin to milk would interfere with the successful grading of milk by preventing the staining of bacteria, microscopic counts were made of whole milk of varying sanitary grades, about which each sample was preserved in a closed container with formalin in the proportion of 500:1. Counts were again made from each of the preserved samples after from two to five days. Of over 50 samples counted, all but 1 would have been put in the same grade whether the count was made on the fresh or the preserved samples. In the author's opinion the laboratory control of the small milk supply could be easily and practically carried on by a central State laboratory where preserved samples of milk could be sent for analysis.

**Marketing practices of Wisconsin and Minnesota creameries.** R. C. FORD (*U. S. Dept. Agr. Bul.* 690 (1918), pp. 15, figs. 5).—The more important phases of the marketing practices by the creameries of Wisconsin and Minnesota and the market distribution of creamery butter are presented.

The average shrinkage of a number of shipments of Wisconsin butter was 0.399 lb. per tub when shipped to Chicago and 0.418 lb. per tub when shipped to New York. Minnesota butter shrank 0.21 lb. per tub to Chicago and 0.27 lb. per tub to New York.

It is noted that "the great majority of creameries in Wisconsin and Minnesota usually produced a quality of butter for which there was an active market demand. The comparative ease with which creameries have been able to contract or to sell their butter to wholesale receivers has not necessitated the

agement of expert salesmanship. With traveling representatives of wholesale receivers willing to contract for the yearly outputs of the creameries and with contracts with receivers frequently renewed year after year, individual action rather than cooperative action among creameries in marketing butter has prevailed. In most instances the creameries have been well satisfied with the prices received, and therefore the necessity of cooperation among creameries has not been strongly apparent. Thus the efforts toward organizing cooperative marketing federations of creameries for marketing butter independent of the regular wholesale outlets have never found much favor or been developed to a great extent."

**A study of prices and quality of creamery butter.** G. P. WARDER (*U. S. Dept. Agr., Bul. 682 (1918), pp. 22, figs. 3*).—A report of an investigation of the sources of butter supply of more than 50 of the largest cities of the United States, covering over 1,000 creameries, the prevailing grade or quality of butter sold at different markets, and the prices paid for different grades.

The average scores of creamery butter sold to all classes of trade in Philadelphia in Chicago in the winter of 1914-15, as indicated by the scoring of one judge, were one point lower than the average scores of butter sold to the most select grocery trade. The difference between the scores of these two representative lots of butter was 0.9 point in New York and 0.5 point in St. Paul and Minneapolis. The fact that large local centralizer creameries are in a position to deliver freshly churned stock three or four times a week to retail groceries makes it difficult for country creameries to establish a dependable market for the best grades of butter at prices above the usual wholesale prices in such places. The average score of 120 lots of country creamery butter in St. Paul and Minneapolis was 89.96, as compared with a score of 89.29 for 220 lots of centralizer brands.

Comparative data are given of the volume of business, the kind of butter and other substitutes handled, the selling prices, and the margins at which butter is handled by different kinds of retail establishments.

These studies show that "the highest retail prices are paid for creamery butter which is sold under a trade-mark or brand that is generally recognized by consumers as a guaranty of uniform excellence of quality. Generally, however, only those creameries which are located in large cities or whose outputs are sufficient to enable them to establish their own marketing organizations in distant centers of population have been able to arrange to have their butter sold under their own distinctive brands or trade-marks. The unusually high prices obtained for certain 'special brands' of butter sold in Philadelphia and New York suggest the possibility of increasing greatly the market returns of creameries making 'States Brand Butter,' provided such butter is sold to the consumers under the exclusive brands of the creameries.

Retailers and consumers might also, with advantage to themselves, improve their buying methods. Small grocers and proprietors of delicatessen shops often pay higher prices for butter of comparatively inferior quality than larger dealers pay for butter of choice quality. Cooperative buying associations among the retailers of some cities in which an expert judge of butter quality does the buying have overcome some of the difficulties encountered by retailers who try as individuals in competition with the larger retailing organizations."

**Neufchâtel and cream cheese: Farm manufacture and use.** E. J. MATHESON and F. R. CAMMACK (*U. S. Dept. Agr., Farmers' Bul. 960 (1918), pp. 3-24, figs. 2*).—Notes on the characteristics of the Neufchâtel group of cheeses are followed by detailed directions for the manufacture and marketing of Neufchâtel and cream cheese. Data are given upon the cost of manufacture and equipment needed for the making of these cheeses.



It is estimated that 100 lbs. of 4 per cent milk will yield 12 lbs. of cream cheese, and 12 lbs. of cottage cheese from the skim milk. The yield of pinicento cream cheese is estimated at 13 lbs., and of Neufchâtel cheese about 15 oz. per 100 lbs. of milk. The estimated cost of manufacture per 3-oz. package of cream cheese is 4.38 cts., for pinicento cream cheese 6.99 cts. per jar of 4 oz., and for Neufchâtel cheese 3.33 cts. per package (2.5 oz.). At current prices for these cheeses and the above costs of manufacture, 100 lbs. of 4 per cent milk should return \$9 for cream cheese, \$8.85 for pinicento cream, and \$8.50 for Neufchâtel.

Pasteurized milk for cheese making, J. J. DUNNE (*Howard's Dairyman*, 1918, No. 11, pp. 466-468).—A review of the progress of pasteurization in cheese making in Denmark. Notes are given on the effect of the war upon the Danish cheese industry, and on the making of Gervais cheese.

### VETERINARY MEDICINE.

Veterinary post-mortem technique, W. J. CROCKER (*Philadelphia and London: J. B. Lippincott Co., 1918, pp. XIV+233, pl. 1, figs. 141; rev. in Current Contents* 8 (1918), No. 2, p. 134).—This work, written to fill a gap in American veterinary literature which has long been felt by the author in teaching post-mortem pathology, includes chapters on the autopsy room, post-mortem instruments, external examination, internal examination of the horse, of ruminants, of swine, of the dog and cat, and of the mouse, guinea pig, rabbit, fowl, and elephant, technique and description of organs, and post-mortem protocol and report.

Animal parasites and human disease, A. C. CHANDLER (*New York: John Wiley & Sons, Inc., 1918, pp. XIII+570, figs. 254*).—The several parts of this work deal with the Protozoa (pp. 26-195), "worms" (pp. 196-321), and arthropods (pp. 322-528).

Conservation of live stock by controlling animal diseases, J. R. MOORE (*Ann. Rpt. Internat. Assoc. Dairy and Milk Insp., 6 (1917), pp. 220-320*).

Report of practitioner's short course in veterinary medicine. Iowa State College of Agriculture and Mechanic Arts (*Off. Pub. Iowa State Col. Agr.* 16 (1917), No. 23, pp. 348, pls. 60).—This report includes lectures given by D. S. White and J. W. Adams, as well as by veterinarians of the faculty.

Proceedings of the Wisconsin Veterinary Medical Association, edited by F. B. HADLEY (*Proc. Wis. Vet. Med. Assoc., 3 (1918), pp. 162, figs. 74*).—Among the papers here presented are the following: Eradication and Control of Bovine Tuberculosis, by O. H. Eliason (pp. 23-29); Bovine Tuberculosis from the Breeder's Viewpoint, by O. Toepfer (pp. 29-31); Testing Cattle for Johne's Disease, by W. R. Clausen (pp. 32-35); Hog Cholera Control, by J. T. Peters (pp. 39-41); An Outbreak of Rabies in Waukesha County, Wis., by H. Lohr (pp. 49-51); Sterility in Cattle, by T. H. Ferguson (pp. 52-54); Federal Act for Tuberculosis Control, by J. E. Gibson (pp. 55-57); The Relation of the Department of Agriculture to the Control of Diseases, by C. P. Norwood (pp. 65-72); Shipping Fever, by P. A. Garman (pp. 74, 75); and Hemorrhagic Septicemia, by O. H. Eliason, J. E. Collins, and W. R. Clausen (pp. 75-77).

[Report of the] health of animals branch, M. BURRELL (*Rpt. Min. Agr. Canada, 1917, pp. 61-71*).—A report upon the occurrence of, and work of the branch with, infectious diseases of live stock.

Annual report of the Bengal Veterinary College and of the civil veterinary department, Bengal, for the year 1916-17, A. SMITH (*Ann. Rpt. Bengal Vet. Col. and Civ. Vet. Dept., 1916-17, pp. [30]*).—This is the usual annual report (E. S. R., 37, p. 780).

slaughterhouse reform, showing the results of inquiries as to the progress of the movement in favor of humane methods in killing animals used for food. S. M. DONTGROU (London: *Council of Justice to Animals*, 1917, pp. 11, 12).

76.—A compilation of information, based upon a questionnaire, on humane slaughtering in Denmark, Sweden, Norway, and Finland, with additional data from several English and other public slaughterhouses and bacon factories.

The specificity of the Abderhalden reaction. W. N. BOYDRETT (*Compt. Rend. Soc. Biol. [Paris]*, 89 (1917), No. 18, pp. 882-887; *abs. in Rec. Med. Vet.*, 24 (1918), No. 9, pp. 270, 271).—The author considers the Abderhalden reaction to be intimately connected with digestion. During the period of activity of the digestive apparatus enzymes, including the proteolytic enzymes, are absorbed by the blood, and at this time the Abderhalden reaction is positive in the case of practically any protein substance. During the period of repose the reaction, even in pregnancy, is always negative. The Abderhalden reaction is consequently of value for detecting the presence of proteolytic enzymes in the blood, but it is not specific.

Peptic and tryptic digestion products as inexpensive culture mediums for routine bacteriologic work. J. E. STICKEL and K. F. MEYER (*Proc. Infect. Dis. Soc.*, 23 (1918), No. 1, pp. 68-81).—Practical methods recommended for the manufacture of amino acids have been applied to the preparation of routine culture media from animal proteins which can not be used as food or which have been treated in such a way that the nutritive value has been destroyed. The following products have been investigated: Tryptic digestion of human lactalbumin, peptic and tryptic digestion of beef and sheep blood, peptic and tryptic digestion of pig or beef liver, tryptic digestion of beef heart and "jennercetin medium," tryptic digestion of casein, and autolysis of pigs' and dogs' livers.

The media thus formed are inexpensive, and on account of the high amino-acid content are considered superior to the usual standard media. Detailed directions for their preparation are given, together with experimental data on their use with different organisms.

"Hormone" medium, a simple medium employable as a substitute for serum medium. F. M. HUSTON (*Jour. Infect. Diseases*, 23 (1918), No. 1, pp. 169-170).—In the preparation of the media described the following factors were kept in mind: (1) To extract the growth factors or hormones by bringing cultural solutions, such as melted agar or gelatin, into contact with meat and blood, (2) to preserve these factors by limiting the amount of heating as much as possible and by not filtering the solutions, (3) to furnish sufficient amino acids by the use of a suitable peptone and the addition of egg yolk, (4) to keep the hydrogen-ion content in the proper zone, and (5) to simplify the technique so that the media can be produced under the most unfavorable conditions.

The media described, in all of which the hormones are furnished by chopped beef heart or steak, are hormone agar, which is said to be available for all general laboratory uses and to have a growth value ten times as great as standard agar and at least as good as average-grade serum agar; hormone semisolid agar, which is especially suitable for the preservation of stock cultures; and hormone gelatin broth, in which the growth of practically all organisms is more rapid and their peculiar characteristics are exaggerated.

The immunologic properties of uveal pigment. A. C. WOODS (*Jour. Immunol.*, 1918, No. 2, pp. 75-82, fig. 1).—A study of the antigenic properties of the uveal pigment of the eye was made in the course of a detailed study of the atrophic theory of sympathetic ophthalmia.

It was found that "the pigment of the uveal tract of the eye possesses the properties of acting as antigen in homologous animals, and in its immunologic reactions is organ specific and not species specific. These findings can be

demonstrated by the complement-fixation reaction with the sera of properly immunized animals, and by perfusion experiments on the eyes of sensitized animals. In the case of the perfusion experiments, the anaphylactic reaction is manifested by a marked contraction of the pupil, and the occurrence of hemorrhages in the fundus. This reaction was used to study the anaphylactic properties of uveal pigment, and the results shown by complement fixation confirmed."

**The isolation, purification, and concentration of immune bodies:** A study of immune hemolysin, M. KOSAKAI (*Jour. Immunol.*, 3 (1918), No. 2, pp. 125-130, figs. 4).—The literature on the problem of obtaining immune bodies from their sera and on hemolysin studies is reviewed, and experiments conducted by the author with the immune hemolysin of the rabbit against sheep's blood are described. The isolation of hemolytic amboceptor from its antigen union is brought about by the following method:

"When the hemolytic power of the original immune serum is 1:1000, it is diluted to 100 times its volume with physiological salt solution; 5 cc. of the diluted serum is poured into 4 cc. blood cells, which are washed free from serum protein with physiological salt solution. After from 15 to 20 minutes at room temperature all of the hemolytic amboceptor has been adsorbed by blood cells, and the antigen-amboceptor union is thus obtained. After the sensitized corpuscular sediment is washed with physiological salt solution several times, till the last trace of serum protein has been removed, this pure antigen-amboceptor combination is mixed with an isotonic or slightly hypertonic water solution of saccharose, glucose, or lactose and left at 55° C. for from 15 to 20 minutes, during which time the vessel is shaken several times.

"The sugar extract, which contains nearly all of the hemolysin used to sensitize the cells, is obtained by centrifugation. In order to purify this sugar extract, which contains substances from destroyed blood cells, it is placed in a separatory funnel and shaken for from one to two hours with from 5 to 10 volumes of ether, this treatment, if necessary, being repeated twice or thrice till at last the solution becomes quite colorless. This colorless solution is dialyzed in parchment against running water in order to eliminate the sugar and traces of salt. The solution thus obtained is concentrated in vacuo to the required volume.

"The reversibility of the antigen and amboceptor union is proved to be practically complete, so far as the immune hemolysin of the rabbit against sheep's blood is concerned."

**Free antigen and antibody circulating together in large amounts (hemagglutinin and agglutinin in the blood of transfused rabbits).** P. ROUSSEAU, O. H. ROBERTSON (*Jour. Expt. Med.*, 27 (1918), No. 4, pp. 509-517, pls. 24-25).—In rabbits transfused almost daily with the whole citrated blood of other rabbits an unusual condition often develops, manifesting itself in an almost immediate clumping together of all the red cells in specimens of the shed blood. This clumping is considered to be due to an agglutinating principle which circulates with the corpuscles against which it is effective. Under ordinary circumstances intravascular clumping is prevented because the union of antigen and antibody can take place only at a temperature several degrees below that of the body. In defibrinated blood, gradually cooled, clumping is first noted at 35° C., the agglutination increasing with the fall of temperature. The reaction is apparently completely reversible, the response to temperature changes being extremely prompt. When once elicited, the agglutinating principle may persist for a long time after the transfusions are stopped.

**Further studies on the preservation of complement by sodium acetate.** T. W. RHAMY (*Jour. Amer. Med. Assoc.*, 70 (1918), No. 26, pp. 2000, 2001).—The

author summarizes as follows the properties of sodium acetate which make it an ideal agent for the preservation of complement, as previously noted (E. S. R., 38, p. 80):

"It has no hemolytic action. It is not anticomplementary. The solution can be sterilized. Dissolved in physiologic sodium chlorid solution, it has the same hydrogen ion concentration as blood,  $P_{H}$  7.4. It preserves and stabilizes complement from two to three months in the ice box, or two weeks at room temperature. It can be used in any strength from 5 to 50 per cent, or in crystal form. Its preservative properties are not antibacterial and, therefore, must be physico-chemical. Added to the whole blood in certain strengths it prevents coagulation. It will preserve human complement."

In view of the evident loose chemical combination of complement with sodium acetate, the author suggests the possibility that complement is an enzyme of definite chemical constitution. The use of sodium acetate in place of sodium citrate in blood transfusion is suggested as an interesting problem to investigate.

Natural occurrence of eosinophilias, S. HADWEN (*Jour. Parasitology*, 4 (1918), No. 4, pp. 135-137).—The author finds that the hypodermic injection of a susceptible animal with juices extracted from ox warbles results in the formation of a blister-like spot which is followed by a necrotic area. "Smears made from the swelling some hours later, reveal the presence of an eosinophilia, and of the material which was injected contained bacteria, phagocytosis by the eosinophils. . . . The reason for the eosinophils assuming the rôle which is usually assigned to the neutrophils is apparently because the bacteria are rendered attractive by their being bathed in the verminous juices."

The pathology of the skin lesions produced by mustard gas (dichlorethylsulphid), A. S. WARTHIN and C. V. WELER (*Jour. Lab. and Clin. Med.*, 3 (1918), No. 3, pp. 447-479, figs. 36; *abs. in Jour. Amer. Med. Assoc.*, 70 (1918), No. 25, pp. 197-198).—Studies are reported of the gross and microscopic pathology of the cutaneous lesions produced in man and animals by the direct application of mustard gas. Descriptions, with accompanying illustrations, are given of the lesions caused by the mustard gas in man, rabbits, and guinea pigs.

The lesion is a chemical burn unlike that produced by heat, electricity, or the ordinary corrosives. It differs from a heat burn in the absence of thrombosis, in the greater degree of fluid exudation, and in the fact that necrosis requires hours, or even days, for its complete development. In man there is no deep edema, but early formation of vesicles, and in animals there is intense and deep edema with no vesicle formation. In none of the animals under examination was there any conjunctivitis or irritation of the respiratory tract produced by the cutaneous applications, indicating that the conjunctival and respiratory lesions are due solely to the direct action of the vapor.

Contrary to the statement of English and French observers, the authors found that the lesion is greatly reduced in intensity if the oil is immediately washed away. Washing within two minutes with tincture of green soap may entirely prevent the lesion.

Investigations on the composition of oil of chenopodium and the anthelmintic value of some of its components, M. C. HALL and H. C. HAMILTON (*Jour. Pharmacol. and Expt. Ther.*, 11 (1918), No. 3, pp. 231-261).—"The experiments, as noted, appear to warrant the following conclusions:

"Oil of chenopodium as ordinarily marketed is a very potent and valuable anthelmintic, but it not infrequently acts as a gastrointestinal irritant, a fact that seems to have been commonly overlooked, disregarded, or allowed to go unnoted, although noted years ago by Brüning and of late years by Salant and Nelson. The gastrointestinal irritation seems to be due to constituents

making up a fourth, or less, of the volume of the oil and constituting the lighter distilled fraction when the lighter boiling constituents are distilled over at temperatures up to 125° C. with a pressure equal to 30 mm. of mercury, or at equivalent temperatures and pressures.

"The use of the lighter fraction as an anthelmintic in preference to the entire oil, in order to protect the patient from gastrointestinal irritation, is apparently indicated. It will be of considerable interest to obtain clinical data in regard to the therapeutic value of this light fraction, for if our findings are confirmed, the use of the refined product would be distinctly indicated, in spite of the extra expense due to distillation and to discarding part of the oil, as the protection of the patient in the administration of anthelmintics constitutes as large a part of the physician's task as the securing of worm removal. Prolonged experience with potent anthelmintics inclines one to attach adequate importance to the dangers associated with these drugs.

"Schimmel and Company stated, without giving any reasons or proof for its statement, that ascaridol, which apparently corresponds to the heavier fraction of oil of chenopodium, is the part responsible for the therapeutic activity of the drug, a statement which has been generally accepted. Our experiments indicate that this constituent is anthelmintic and also a gastrointestinal irritant, while the lighter portion of the oil is apparently even more anthelmintic and much less irritating. It is also worthy of note, in this connection, that Salant and Nelson found ascaridol 30 per cent more toxic than oil of chenopodium, an additional reason for using the lighter fraction of the oil."

**Toxicity of certain widely used antiseptics, H. D. TAYLOR and J. H. AUSTIN** (*Jour. Expt. Med.* 27 (1918), No. 5, pp. 635-646).—The toxicity of various antiseptics was investigated by injecting increasing doses into mice intraperitoneally and into guinea pigs both subcutaneously and intraperitoneally.

It was found that the method of testing the toxicity of antiseptics by subcutaneous injection was not satisfactory, because exudation reduces the rate of absorption and makes uncertain the amount finally absorbed. The substances injected intraperitoneally arranged in order of their decreasing toxicity were eucalyptol and brilliant green; mercuraphen; mercuric chlorid and chloramin T; dichloramin T and proflavine; hychlorite, Dakin's hypochlorite, Javelle water and magnesium hypochlorite; and iodine and phenol. The authors consider it inadvisable to use any of these antiseptics in closed cavities.

**Field investigations of forage poisoning in cattle and horses, H. P. RICE and H. S. GRINDLEY** (*Illinois Sta. Bul.* 210 (1918), pp. 163-176, figs. 4).—The first part of this bulletin deals with feeding tests of corn silage suspected of causing forage poisoning in cattle. Attempts to reproduce forage poisoning experimentally in cattle by feeding suspected or contaminated feeds have been unsuccessful. The results seem to indicate that most cattle are not so susceptible to forage poisoning as are horses and mules and that contaminated corn silage and possibly other animal feeds which are unsafe or fatal to horses may be fed with less danger to cattle. Evidence from many outbreaks leads the authors to suggest that some cattle may be more susceptible than others and that damage or otherwise contaminated corn silage and possibly other feeds may in some instances produce fatal results in cattle following ingestion.

The second part of this bulletin consists of a report of forage poisoning investigations with horses at Ottawa, Ill., a preliminary discussion of which **Graham** has been previously noted (*E. S. R.*, 39, p. 387). Contaminated corn silage from a silo near Ottawa induced a fatal type of forage poisoning in horses following ingestion. The most obvious and characteristic symptoms exhibited were paralysis of the throat, profuse salivation, and lack of muscular coordination. Three steers, a cow, and two calves were fed experimentally for seven

on a ration composed exclusively of this silage and water without producing any noticeable symptoms of forage poisoning.

Prophylactic doses of Botulinus antitoxin and related immune sera, developed by Graham, Brueckner, and Pontius at the Kentucky Experiment Station produced experimental horses against the effect of the daily ingestion of the contaminated corn silage responsible for the Ottawa outbreak. The results of the tests apparently justify a trial of these sera in cases of similar outbreaks.

**Notes on larkspur eradication on stock ranges, C. D. MARSH and A. B. JOHNSON** (*U. S. Dept. Agr., Bur. Anim. Indus., 1918, pp. 5*).—It is pointed out that there are three ways in which the continued losses to cattle from larkspur on the range may be reduced, namely, by the use of the medicinal remedy, by leading the animals away from the plants during the time when they are most susceptible, and by destroying the plant. As indicated in the publication previously noted (*E. S. R., 38, p. 82*) the main reliance must be upon the second and third methods, inasmuch as many cases of poisoning occur when the remedy cannot be applied because the stockman is not on hand at the right time.

Attempted eradication of larkspur from stock ranges in the West in some cases has not given as successful results as it might have because the roots were not cut at the depth necessary to stop further growth. Experimental cutting of *Delphinium barbeyi* followed by observations of the effect a year later shows that to insure results the roots should be cut at least from 6 to 8 in. below the surface. "Observations upon two other species, *D. cucullatum* and *D. geraniifolium*, show that in them also the cutting should be at least from 6 to 8 in. below the surface. Certain of the high larkspurs have shallow roots, so that any of the plants can be pulled up." It is pointed out that the best time to cut the larkspur is at about the period of blossoming, for earlier all the shoots of the year will not have developed.

**On the life history of *Ascaris lumbricoides*, F. H. STEWART** (*Parasitology, 1918, No. 2, pp. 197-205*).—In continuation of investigations previously noted (*E. S. R., 39, p. 286*), experiments are reported which show that ripe eggs of *Ascaris* hatch in the intestine of the pig. The larvæ issuing from these eggs enter the body of the pig and pursue the same course through the body as in the rat and mouse, having been found in the lung from the sixth to the eighth day after infection in the trachea on the eighth day. Dead larvæ were found in the feces of the pig on the eleventh day after infection.

In experiments in which six pigs were fed *Ascaris* eggs five proved negative and one possibly positive. Experiments are also reported on the infection of mice with the larvæ from mice and on obtaining *Ascaris* larvæ in the cecum of the mouse, together with notes on the anatomy of the larvæ of *A. suilla* from the pig, the economic importance of ascariasis in pigs, importance of ascariasis in man, and on the development of the eggs of *A. lumbricoides* in human feces, in the feces of the pig, in contaminated and uncontaminated water, and on the culture of the soil.

**Blackleg and hemorrhagic septicemia, C. A. CARY** (*Ann. Rpt. State Vet. Ala., 1917, pp. 15, 16*).—The occurrence, modes of infection, symptoms, lesions, and treatment of blackleg and hemorrhagic septicemia are discussed.

**Differentiation of the paratyphoid enteritidis group.—IV, The behavior of *B. paratyphosus A* and *B. paratyphosus B* in milk, E. O. JORDAN** (*Jour. Infect. Diseases, 22 (1918), No. 5, pp. 511-514*).—In this paper, which is in continuation of the article previously noted (*E. S. R., 39, p. 188*), the author deals with the paratyphoid types in milk.

**Studies on the paratyphoid enteritidis group.—V, The correlation of cultural and agglutination results, with special reference to *Bacillus paratyphosus B* and *B. cholerae suis*, C. KRAMWIEDE, JR., L. A. KOHN, and EUGENIA**

VALENTINE (*Jour. Med. Research*, 38 (1918), No. 1, pp. 89-125).—The studies reported in this fifth contribution are summarized as follows:

"The tendency to variations, as well as the differences in avidity for carbohydrates, shown by otherwise similar types has led to contradictory opinions as to the classifying significance of the cultural reactions of members of the paratyphoid enteritidis group. By correlating the fermentative results, especially in relation to quantitative reductional differences, well-defined group result, as shown in the tables presented. This grouping correlates host origin and agglutinative differences.

"*B. cholerae suis* and *B. paratyphosus* B in this way are separable one from the other, and the cultural differences are paralleled by agglutinin and absorption. *B. cholerae suis* is therefore a distinct type, and most of the strains studied have been similar, and constitute a definite subgroup. This indicates that *B. paratyphosus* B is essentially a human pathogen; that paratyphoid fever due to this type, is normally caused by the transfer of the bacillus from man to man, and that infected swine are not a source of contagion for this disease either directly or indirectly, through the consumption of infected food."

A note on the occurrence of Negri bodies, J. W. CORNWALL (*Indian Jour. Med. Research*, 5 (1918), No. 3, pp. 478-480).—Based upon experiments conducted at the Pasteur Institute of Southern India, it appears "that numerous and large Negri bodies invariably occur after (a) subdural inoculation with street virus brain matter, and (b) subcutaneous inoculation with street virus salivary gland matter, when the latter has proved virulent; that scattered minute Negri bodies may sometimes be found after numerous subdural passages in one and the same species; that scattered, but fairly large, Negri bodies may sometimes be found if the fixed virus of one species be subdurally inoculated into another species; that after subcutaneous inoculations of street virus brain matter (a) large and numerous Negri bodies seldom occur, (b) small and numerous Negri bodies often occur, and (c) often no Negri bodies at all can be found; and that after subcutaneous inoculations of fixed virus brain matter minute Negri bodies may sometimes be found."

Action of ether on rabic virus, P. REMLINGER (*Compt. Rend. Acad. Sci. [Paris]*, 166 (1918), No. 18, pp. 750, 751).—Experimental evidence is given that rabic virus may be rendered avirulent by the action of ether. This virus when inoculated under the skin of dogs is said to confer lasting immunity. The author suggests the utilization of this fact in the development of a simple method for the preventive treatment of rabies in man and animals.

On a new species of spirochete isolated from a case of rat-bite fever in Bombay, R. ROW (*Indian Jour. Med. Research*, 5 (1917), No. 2, pp. 386-393, pls. fig. 1).—"The rat-bite fever of the patient under consideration was caused by the inoculation of a specific spirochete by the bite of the rat which had probably a generalized spirochetosis. The incubation period of rat-bite fever in man is about the same as in experimental mice, 6 to 10 days, 10 days in the present case. The spirochete recovered from the human lesion is quite different from any hitherto described, being from 2 to 3  $\mu$  in length and showing only two sometimes three curls. This spirochete is communicable and pathogenic to mice and rats, which, when infected, show a latent period of 6 to 10 days. The disease in these rodents continues several weeks.

"Rat-bite spirochetosis in man is like syphilis, viz, localized at the seat of inoculation to begin with, then becoming generalized after a definite period of incubation, and lastly, manifesting itself in the cutaneous lesions from which the spirochete can be isolated; while the spirochetosis in the mouse is like the relapsing fever in man, viz, a generalized septicemia, the spirochete being recoverable from it

stream, the disease being, however, of several weeks duration without relapses.

Before the demonstration of the virus in the papules, the typical paroxysms of the fever with crises and relapses suggested a spirochetal infection clinically. After the subsequent demonstration of the spirochetes in the lesions the diagnosis was confirmed. The complete cure after the injection of neosalvarsan and the rapid disappearance of the eruption (on the third day after the injection) is further evidence of the spirochetal cause of the symptoms in the case under consideration.

Demonstration of micrococci in the bones in rickets and scurvy. LENA WATSON (*Jour. Infect. Diseases*, 22 (1918), No. 5, pp. 457-461).—In summarizing the study here reported the author states that while it can not yet be positively stated that "the lesions described are due directly to the action of the micrococci so frequently found in connection with the lesions, and particularly the osteomyelitis, the presence of cocci appears at least significant. Even should we subsequently decide that these organisms are but secondary invaders, it still seems that the evidence presented by microscopic preparations of the lesions argues for the presence of some infectious agent, and emphasizes the need of further work on the bacteriology of these conditions."

The X-ray appearances of trichiniasis, C. GOULDESBROUGH (*Lancet* [London], Oct. 1, No. 13, p. 468, fig. 1).—The history and X-ray appearance of a case of trichiniasis are reported upon.

Contagious abortion of cattle, W. L. WILLIAMS (*Cornell Reading Course for the Farm*, No. 131 (1917), pp. 163-184, figs. 3).—This is a manual of instruction as to contagious abortion, including the effects of the disease, its prevalence, methods of control, and precautionary measures. The problem of saving strong calves is discussed. The use of scours serum is advised for calves in a herd where abortion is common.

John's disease, A. L. SHEATHER (*Agr. Jour. India*, 15 (1918), No. 1, pp. 23-31, fig. 2).—The recent discovery of the occurrence of John's disease in India has led to the preparation of this summary of information.

Worm nodules in cattle (*Advisory Council Sci. and Indus., Aust., Bul. 2* (1917), pp. 37).—Five papers are presented in this bulletin, namely, Report of the Special Committee Appointed to Inquire into the Nodule Disease in Cattle and to Make Recommendations as to a Future Plan of Research, by S. Dodd and others (pp. 5-15); The Occurrence of Onchocerciasis in Cattle and Associated Animals in Countries Other Than Australia, by Georgina Sweet (pp. 16-17), an abstract of the paper previously noted (*E. S. R.*, 34, p. 582); Bovine Onchocerciasis in South America, by Piettre (p. 18), a translation of the paper previously noted (*E. S. R.*, 37, p. 80); Further Investigations into the Etiology of Worm Nests in Cattle Due to *Onchocerca gibsoni*, III, by J. B. Grand, S. Dodd, and J. F. McEachran (pp. 19-29), the second part of which has been previously noted (*E. S. R.*, 37, p. 181); and Investigations into the Cause of Onchocerciasis in Cattle Conducted in the Northern Territory, by J. Hill, J. F. McEachran, and C. G. Dickinson (pp. 30, 31), a summary of a paper previously noted (*E. S. R.*, 38, p. 82).

Common diseases of swine, H. A. GREER (*Amer. Jour. Vet. Med.*, 15 (1918), No. 7, pp. 317-320).—This paper discusses the differential diagnosis of some of the more common diseases of swine, particularly those which may be confused with cholera and whose presence may explain unsatisfactory results in the use of the serum treatment. The diseases are considered under two aspects, first, when existing independent of cholera but sometimes mistaken for it, and second, when present as a complication of hog cholera. The disease discussed in greatest detail is necrobacillosis in its different manifestations.



Action of salvarsan on swine erysipelas bacilli in vivo, K. BIERBAUM (*Ztschr. Immunitätsf. u. Expt. Ther.*, 1, Orig., 26 (1917), p. 325; abs. in *Re. Bact.*, 7 (1917), No. 5-6, p. 152).—In the experiments reported salvarsan and trypsin-salvarsan had a definite specific curative action on white mice infected with swine erysipelas bacilli. Contrary to statements of some observers, this curative action resulted when fully virulent bacilli were used and not merely in infections with avirulent or only slightly virulent organisms.

Swine erysipelas in man, N. SVITH (*Ugeskr. Læger*, 80 (1918), No. 4, p. 127; abs. in *Jour. Amer. Med. Assoc.*, 70 (1918), No. 16, p. 1200).—The author reports having observed six cases of this disease, all in men who had recently slaughtered infected hogs.

Necrobacillosis in swine, R. GRAHAM (*Illinois Sta. Circ.* 222 (1918), pp. 1 figs. 7).—This circular contains a general description of necrobacillosis in swine from the point of view of occurrence, susceptibility, course, and symptoms, and detailed descriptions of the four common types of necrobacillosis—necrotic stomatitis or infectious sore mouth, necrotic rhinitis or bull nose, necrotic enteritis and necrotic dermatitis. Suggestions are given for the treatment and prevention of the disease.

Necrobacillosis and its relation to hog cholera, B. B. BOWEN (*Amer. Jour. Vet. Med.*, 13 (1918), No. 7, pp. 329-331, 352).—This article deals with the general and special pathology of the diseases caused by *Bacillus necrophorus* and the relations existing between necrobacillosis and hog cholera.

Lesions in spavin and their significance, S. A. GOLDBERG (*Cornell Vet.*, (1918), No. 2, pp. 107-119).—The author's study of cases here reported enabled him to consider the following conclusions justifiable:

"There are very commonly found in horses and cattle low-grade polyarticular inflammations, leading to erosions and ankylosis. In these cases the hock joints are the ones most often affected by these inflammations. It is advisable to have the term spavin indicate any inflammation of the hock joint leading to ankylosis. The origin of spavin may be in the joint proper as well as in the subchondral bone. In many cases spavin is apparently caused by infection. The primary seat of erosions and ankylosis may be in any of the intertarsal as well as the tarso-metatarsal joints. The so-called 'synovial fossae' and pathological erosions. The so-called 'synovial villi' are, in many cases at least, pathological outgrowths caused by mild irritation. The so-called 'bone points' in the articular cartilages are areas of necrosis in which calcification has taken place. A periarticular ankylosis is, in some cases at least, due to an ossifying inflammation of the capsular ligament. In the cases studied osteoarthritis does not play an important rôle in the rarefying osteitis."

Generalized sarcomatosis of the fowl, B. F. KAUFF (*Vet. Jour.*, 74 (1918), No. 513, pp. 80-85, figs. 6).—Of 730 autopsies held at the North Carolina Experiment Station upon hens and cocks ranging in age from 12 months to 3 years, 8 were found affected with generalized sarcomatosis. Round-celled sarcoma was the most prevalent type, and round-celled lympho-sarcoma was frequently observed.

## RURAL ENGINEERING.

Irrigation by means of underground porous pipe, E. B. HOUSE (*Colorado Sta. Bul.* 240 (1918), pp. 3-15, figs. 9).—Results are reported as obtained with a subirrigation system installed on the college farm in 1913. An old apple orchard of about one-third acre, an alfalfa field one year old of 0.7 acre, and a plowed tract of 1.6 acres subsequently planted to barley and potatoes in 1913, wheat in 1914, and corn in 1915 and 1916, were utilized. The cost

installation was at the rate of \$218.18 per acre. The conclusions drawn from the experiment are as follows:

—Subirrigation by means of underground pipe is not to be recommended for any of the ordinary farm crops on account of the excessive cost for installation. It can be recommended only for the most intensive farming where water is very scarce and valuable, and only a small stream is available.

—The lateral percolation of the water from the tile lines in deep silt-loam soil is not sufficient to warrant these lines being placed from 16 to 25 ft. apart. The water percolates downward than upward or to the side, and it would be necessary to place these tile lines not more than 8 ft. apart in order to bring the moisture to the roots of the growing crop. This applies to soil similar to that on the subirrigated field at the college farm only. It may be, and probably is, a fact that with a hard-pan or an impervious stratum of some kind slightly below the tile, and especially in early or porous soils, the lateral percolation of the water would be increased very much and the success of a system with the lines as far apart as 16 or 25 ft. could be guaranteed, but in deep silt-loam soil the lateral percolation of the water is disappointing.

—With deep-rooted crops, such as alfalfa, or with orchards this form of irrigation may be practiced with success as far as lateral percolation is concerned, but the cost of installation is so great that it can not be recommended.

—There has been no clogging of the lines due to the entrance of roots for the four years that the system has been in service.

—The water used for this system was drain water which contained some alkali, but it was evidently not sufficient to cause disintegration of the tile lines as no trouble on this score was encountered.

—A very small stream of water can be successfully used with a subirrigation system of this kind. A stream that would not answer at all for surface irrigation might be more than ample to supply a pipe system for subirrigation on a much larger area."

**Efficiency in citrus irrigation.** F. M. EATON (*Chula Vista, Cal.: The San Diego Land Corporation* [1918], pp. 16, figs. 10).—In this paper, read before the grapes club at Riverside, Cal., the author discusses the need for greater efficiency in citrus irrigation and presents a brief analysis of some of the factors deemed of especial importance to proper irrigation, with particular reference to conditions prevailing in the Chula Vista district of California.

**Typical specifications for bituminous road materials.** P. HUBBARD and C. S. BARE (*U. S. Dept. Agr. Bul. 691* (1918), pp. 60, figs. 8).—Specifications worked out by the Office of Public Roads and Rural Engineering, conforming in general form to the recommendation of the first conference of State highway test engineers and chemists, previously noted (*E. S. R.*, 38, p. 87), are presented, being grouped according to type of material. The methods of test and directions for sampling are appended.

**Tractor experience in Illinois.** A. P. YERKES and L. M. CHURCH (*U. S. Dept. Agr., Farmers' Bul. 963* (1918), pp. 29, fig. 1).—This is essentially a revision of Farmers' Bulletin 719 (*E. S. R.*, 35, p. 282), based on detailed reports received from more than 200 tractor owners in Illinois during the summer of 1917 and from 284 in the spring of 1918.

The approximate total cost reported for plowing an acre with a tractor under prewar conditions is summarized in the table following.

Approximate cost of plowing an acre with 2-, 3-, and 4-plow tractors, based on average cost of \$800, \$1,100, and \$1,400, respectively, and a life of 7½ years, 45 working days per year.

Size of tractor.	Total. <sup>1</sup>		Fuel.		Oil.	Grease.	Repairs.	Depreciation.	Man labor.	Interest.
	Gasoline tractor.	Kerosene tractor.	Gasoline.	Kerosene.						
2-plow.....	\$1.58½	\$1.33½	\$0.50	\$0.25	\$0.05½	\$0.02	\$0.11	\$0.36	\$9.45	\$0.80
3-plow.....	1.47½	1.22½	.50	.25	.05½	.02	.11	.37	9.51	.80
4-plow.....	1.50½	1.25½	.50	.25	.05½	.02	.12	.42	9.59	.80

<sup>1</sup> The cost of housing the outfit and other minor overhead charges, such as taxes, insurance, etc., are not included.

In the opinion of the men reporting the minimum number of acres in the corn belt on which 2-, 3-, and 4-plow outfits may be expected to prove profitable are 130, 170, and 210 acres, respectively. More than 50 per cent of the tractor owners reported that the quality of work done by the tractor is better than that done by horses, while less than 3 per cent regarded it as poorer.

As to reliability, "the reports of tractor owners indicate that with a careful and proficient operator a gas tractor is a very dependable source of power. Occasional slight delays probably will be encountered, but serious ones will be exceptional, whereas with a careless or incompetent operator expensive delays are apt to be frequent."

Less displacement of horses than is commonly expected was reported. The greatest advantage of the tractor has been "in the fact that it does the heavy work quickly and thus completes it within the proper season, since it places at the farmer's command a large amount of untiring power when needed."

## RURAL ECONOMICS.

**Agriculture and the land.** G. F. BOSWORTH (*Cambridge, England: University Press, 1917, pp. [VII]+93, pl. 1, figs. 28*).—This book covers not only the field of agriculture but treats of garden cities, water supply, and internal communications. Among the topics treated are the history and development of British agriculture; the effect of climate; the crops and live stock; cooperative organizations; immigration; and working wages, capital, and labor as they relate to farming.

**The farm and the nation.** J. PORTER (*High Town, Hereford, England: Jackson & Carter, 1918, pp. 32*).—Among the topics discussed in this pamphlet are foreign competition, national agricultural loss, waste of food, manure, energy, and capital by the present system of farming, the economical distribution of agricultural products, a national system of cheese factories, milk depots, meat collection and distribution, fruit preservation, and granaries, and the possibility of county food exchanges.

**Work of the Office of Farm Management** relating to land classification and land tenure, W. J. SPILLMAN (*Amer. Econ. Rev., 8 (1918), No. 1, Sup., pp. 61-71*).—The author describes the cooperation of the Office of Farm Management of the U. S. Department of Agriculture with the Bureau of the Census in determining a proper classification of farm lands and the work of the office in studying the proportion of farm land in crops, pasture, and timber, how the farmers acquire their status, and the problem of tenancy and ranch economics.

**The utilization of land not in farms.** B. H. HUBBARD (*Amer. Econ. Rev., 8 (1918), No. 1, Sup., pp. 55-64*).—The author discusses the public lands remaining

ing in this country, the use of the public domain, and privately owned lands not in farms. He points out that wherever a given amount of labor or capital will immediately produce more on wild land than is being now produced by such labor and capital there is a clear gain in developing the new land. However, the cry for more labor off the farm land now operated is hardly in accord with the demand for the preparation of new fields on which an additional expenditure of labor and capital is demanded before cultivation or other utilization may be begun. Rather we need more fertilizer, more machinery, and all the labor available on the farms as they are.

**Government aid and direction in land settlement.** E. MEAD (*Amer. Econ. Rev.*, 8 (1918), No. 1, Sup., pp. 72-98).—The author criticizes the land settlement policy of the United States and makes comparisons with conditions in Australia. He also describes, briefly, the system of land settlement being introduced into California.

**Farm management surveys** (*Agr. Gaz. Canada*, 5 (1918), No. 5, pp. 489-491).—This is a summary of a survey of 113 farms in the Township of Caledon, Peel County, Ontario. The author has summarized his findings as follows:

(1) The size of the business on the small farm engaged in general mixed farming is too small to pay all expenses and leave more than a very small labor income for the operator; (2) High profits from live stock have a greater influence on the labor income than have high crop yields; (3) The quality of the live stock determines the amount of feed which may be fed profitably, since heavy feeding to stock of low quality means a loss rather than a gain. In order that the crops grown may be fed upon the farm to keep up the soil fertility, and at the same time yield a profit, the quality of the stock on a great many farms must be improved.

**The Chicago milk inquiry.** C. S. DUNCAN (*Jour. Polit. Econ.*, 26 (1918), No. 1, pp. 321-346).—Among the conclusions drawn by the author from a study of this inquiry is that dairymen who own farms have a ready alternative use of their crops as grain or live stock if they are not assured as much profit in dairying. In other words, they expect to run their farms on a commercial basis, doing with them what pays best. The investigation thus shows the great difficulty in attempting to set the price of a finished product while leaving uncontrolled the materials from which it is produced, and which have other uses.

**A study of marketing conditions in the Salt River Valley, Ariz.** J. H. GIBBINS (*Arizona Sta. Bul.* 85 (1918), pp. 3-69, figs. 6).—This is a study of the conditions of marketing various agricultural products of Salt River Valley during the crop season of 1917, made in cooperation with the U. S. Department of Agriculture.

The author concludes that a participation of the Salt River Valley Water Users' Association in the marketing problem is eminently desirable from the viewpoint of the producer. The study indicates that the present inability of growers to supply dependable quantities to buyers who desire to negotiate for such products year after year may be overcome by stabilizing cropping plans, and that the question of better grades and standards and plans for the consolidation of products for shipping may be solved by a more complete cooperative action on the part of the farmers.

**Plan of the Department of Agriculture for handling the farm-labor problem.** E. V. WILCOX (*Amer. Econ. Rev.*, 8 (1918), No. 1, Sup., pp. 158-179).—The author describes the organization of the Office of Farm Management and the U. S. Department of Labor with reference to the farm-labor problem and the methods used by the farmer to ascertain the farm-labor shortage and to distribute labor. He also calls attention to various sources of farm labor that

may be developed and to the effects of the compulsory-work laws in developing a supply.

**The labor situation for fruit farmers, MISS HARVEY** (*Ann. Rpt. Fruit Growers' Assoc., Ontario*, 49 (1917), pp. 59-65).—The author gives a brief description of the efforts to use woman labor in connection with gathering of fruit in the Province of Ontario, Canada.

**Agricultural banking in the Delta of Burma, L. DAWSON** (*Agr. Jour. India*, 13 (1918), No. 1, pp. 71-81).—The author has discussed the conditions under which the agricultural industry is at present financed, the measures adopted by the Government for affording financial assistance to the farmers, and proposals for better financing in the future.

**Land and Agricultural Bank of South Africa** (*Union So. Africa, Land and Agr. Bank So. Africa, Rpt. 1917*, pp. 52).—This report contains a description of the general type and condition of farming where the local banks are located and the extent of the business of the individual organizations within the Union.

**Cooperative farm implement societies, T. WIBBERLEY** (*Jour. Bd. Agr. [London]*, 22 (1915), Nos. 5, pp. 413-417; 6, 570-573, pl. 1; 23 (1916), No. 1, pp. 52-53, pl. 1, fig. 1).—A brief description is given of the workings of the Irish cooperative farm implement societies.

In these societies implements are usually hired out in the order in which applications for them are made by the members, except that since the main object is to encourage tillage precedence is given to the member who wishes to use the implement for the longest period. In a well-conducted society it has been found that the cooperatively owned implements can earn sufficient returns to pay for their initial cost and contribute toward the purchase of additional implements.

A discussion is also given of the operation and management of cultivating implements, thrashing machines, and motors.

**County organization for rural fire control, W. METCALF** (*California State Circ.* 202 (1918), pp. 23, figs. 5).—This circular discusses in detail six items deemed essential for an adequate fire-protection plan for a county: A county fire warden; local fire companies, each with competent officers and a district fire plan; installation of adequate fire-fighting equipment; a comprehensive county fire ordinance; publicity measures throughout the county and in each local district; and prompt reports on all fires. It concludes with a list of the California counties, showing the organizations cooperating in fire protection, sample forms for reports, and the text of the fire ordinance of Stanislaus County.

**Farm household accounts, W. C. FUNK** (*U. S. Dept. Agr., Farmers' Bul.* 964 (1918), pp. 11, figs. 6).—Methods for adapting household accounting systems to the farm household, making special allowance for supplies provided by the home farm are discussed.

**Monthly crop report** (*U. S. Dept. Agr., Mo. Crop Rpt.*, 4 (1918), No. 7, pp. 6-84, fig. 1).—This number contains the usual data with reference to acreage and condition of the principal crops on July 1, 1918, with comparisons; average prices received by producers of the United States; range of prices of agricultural products at important markets; and the estimated farm value of important products June 15 and July 1. There are also reports on kafirs, beans, broom corn, hops, cotton, pecans, peaches, early apple production, area of sugar beets planted, winter wheat planted compared with harvest acreage, standards for shelled corn, revised wheat prices, field beans, acreage estimates; Florida and California crops, general crop conditions by States, commercial cherry crop, commercial acreage of watermelons and cantaloups, honey yields and prospects.

peach estimates by types and districts, world's raw silk production, cabbage or kraut, etc., and special articles comparing crop production and railroad tonnage, and giving data as to the production per man and per acre for different countries.

**Acres and live stock returns of England and Wales** (*Bd. Agr. and Fisheries* [London], *Agr. Statist.*, 52 (1917), No. 1, pp. 36).—This report continues the information previously noted (E. S. R., 36, p. 690) by adding data for 1917.

**Estimates of area and yield of principal crops in India, 1915-16** (*Dept. Statis. India, Est. Area and Yield Princ. Crops India, 1915-16*, pp. [5]+27).—This report continues information previously noted (E. S. R., 35, p. 91), adding data for 1915-16.

**[Agriculture in Japan]** (*Statis. Rpt. Dept. Agr. and Com. Japan*, 31 [1916], pp. 1-153).—These pages continue the statistical data previously noted (E. S. R., 37, p. 492).

### AGRICULTURAL EDUCATION.

**Vocational teachers for secondary schools:** What the land-grant colleges are doing to prepare them, C. D. JARVIS (*U. S. Bur. Ed. Bul.*, 38 (1917), pp. 54).—This is an account of what the land-grant colleges are doing to prepare teachers of agriculture, home economics, and trades and industries for the secondary schools, discussed under the uniform heads for each institution of its nature and scope, requirements for registration, students, and instructors. Concluding each account a brief statement is made of the institution's powers and influences concerning certification.

Of the 48 institutions teaching agriculture, 40 now offer a special 4-year collegiate curriculum for the training of teachers, including at least a 2-hour course in special methods of teaching agriculture and one 3-hour course in either psychology or education. Much variation in methods is shown, especially in the State universities where a part of the curriculum is offered by the college of agriculture and a part by the school or department of education.

As regards the nature and scope of teacher-training work in agriculture, some institutions offer a special curriculum quite different from the regular agricultural curriculum. Others require the regular agricultural curriculum and the election of agricultural education as the major option. Some require the regular curriculum with a major option in some one phase of agriculture and the necessary educational courses as electives. In some the regular agricultural curriculum includes all or part of the educational work required for certification. In others a 4-year curriculum in education is offered with opportunity for majoring in agriculture or any other subject or subjects that the candidate expects to teach. It is held that in general the same results are accomplished in each case, but there seems to be a divergence of opinion as to whether students who are preparing to teach should be given general instruction in agriculture or specialized instruction in some phase of agriculture.

A great variation is found in the proportion of time devoted to the various classes of subjects and in the total amount of work required. As regards frequency of occurrence of subjects in educational courses, it is shown that of a total of 637 courses offered, aggregating 1,767 semester hours, 39 courses, aggregating 110 semester hours, are offered in agricultural education, and 22 courses, aggregating 67 hours, are offered in rural education.

Twenty-nine institutions require practice teaching, which is provided for in many cases by special high schools for the purpose and through cooperation with the local schools. Of the 40 institutions offering teacher-training curricula in agriculture, 38 require for admission at least 14 units of high-school work.

Thirty-two of the institutions require at least two years of collegiate work before registration for psychology and educational courses will be permitted. Practical farm experience is seldom a requirement for admission to the freshman class. A few institutions require a certain amount before entrance to the junior year. Sixteen institutions require some practical farm experience before graduation, the amount varying from six weeks to one year of ~~experience~~ experience obtained, as a rule, either on the student's home farm or an approved farm.

In 34 institutions reporting, 841 men and 18 women were registered in 1916 for training in agricultural education, including all those who had actually declared their intention of preparing to teach. From 35 institutions reporting, 513 students graduated with professional training in agricultural education in 1916. Of these 299 are known to be engaged in the teaching or supervision of agriculture in the schools. Twenty-six institutions report that a total of 116 graduates in 1916 from their regular agricultural curricula are also known to be teaching or supervising agriculture in the schools.

Thirty-three of the land-grant agricultural institutions offer 4-year curricula for the preparation of teachers of home economics. Most of these curricula provide sufficient elective work for students to carry enough in education to meet the requirements for certification. While in many of these institutions home economics has been associated with agriculture, and even in the State universities is frequently constituted a department or division of the college of agriculture, the tendency at the present time is toward segregation, with a view to establishing home economics as a major division of the college or university. In some institutions home economics is organized as a department of the college of arts and science. In Pennsylvania State College it is a department unattached to any of the major divisions, but seems to be organically coordinated with them.

Many of the institutions offer two curricula in home economics, one bearing especially upon domestic science or foods and nutrition and the other upon domestic art or textiles and clothing. They usually offer professional courses in each for those who are preparing to teach. In some cases the curricula are distinct throughout the four years, requiring, however, in the first two years some work in both branches. Sometimes the work in both curricula will be the same for the first two years. About an equal number of institutions, however, still maintain a single curriculum embracing both branches of home economics, there being usually sufficient elective work to enable students to specialize to some extent. Out of 33 institutions reporting, 30 require practice teaching and opportunity for such work is offered in the others.

All of the institutions offering training courses in home economics require at least 14 units of high-school work for admission to the freshman class. The institutions assume that all students registering for home economics will have had some practical experience in work about the home and therefore do not make this a requirement for admission. Many curricula offer opportunity for independent experience in household management by means of a demonstration cottage.

At the 27 institutions reporting, 1,318 women are now registered for professional training in home-economics education. At 28 institutions reporting, 693 students graduated with professional training in 1916. Of these 487 are known to be engaged in teaching or supervising home economics. Nine 1916 graduates in home economics without professional training are also known to be engaged in school work.

Report of (the) committee on mobilization of high-school boys for farm service (*Boston: Mass. Com. on Pub. Safety, 1917, pp. 60, pl. 1*).—This report outlines the history of the movement in Massachusetts to mobilize high-school boys for farm work, including principles of mobilization, methods of conducting the work, cooperation, and office administration; sites, equipment, and management of camps; an evaluation of the movement; and the relations of the committee with the Boys' Working Reserve. It is recommended that the work begun during the current year be continued in 1918 and that plans be made for camps involving an estimated expenditure of \$50,000 of public rather than private money; that the committee assume the responsibility and control of the supervision of camps through a director assisted by camp supervisors, etc.; that training courses for camp supervisors and cooks be offered; and that camp equipment, supplies, commissary, and business methods be standardized.

The duties of the director should be to carry on the campaign of publicity, to secure cooperation, to make plans for enlistment, to secure placement, etc. Men who have had some previous experience in agriculture, who have some appreciation of the problems of a farmer, men who have had military training or direction of boys in first-class private camps, offer possibilities as camp supervisors. It is suggested that the course of training for camp supervisors include instruction in the routine and care of camps, camp sanitation, recreation and use of leisure time, camp discipline, camp accounting (financial), the selection and care of boys for farm work, and the protection and instruction of boys at work on the farms. Except in cases where close and constant supervision of boys is possible, or where the parent will assume the responsibility for the boy's welfare, sending boys away from home on isolated farms is not recommended. The method of placing boys through camps proved to be the most successful way of taking labor away from the place where there is a large surplus to the place where it is needed. The committee sees much value in preliminary training for boys and a system for physical "hardening up" would be equally advantageous.

The plan adopted by Maine, which, during the season of 1917-18, appropriated from funds at the disposal of the Council of National Defense \$150,000 for the training and placing of boys in farm service, is briefly outlined, together with a statement of public appreciation of Maine's solution for the back-to-the-farm movement for boys in the successful first season of the Junior Volunteers of Maine.

The committee is convinced that given the three essentials of time—that is, early enrollment of boys and arrangements for employment with farmers, of proper supervision, and of cooperation with the local agricultural organizations, the work can be successfully carried on. In the opinion of the committee there is no question as to the value of the service rendered by these boys, and the expense to the State of double or treble the amount (\$4.46 per boy) would be justified by the benefits the boys receive in health and experience without taking into consideration their productive value.

The text of a bulletin of the committee on food production and conservation of the department of mobilization of school boys for farm service, entitled "Plan for Cooperating Schools in Massachusetts," a list of publications of this committee, data on camp inspections and recreational equipment furnished, newspaper articles illustrating methods of local supervision and the cooperative efforts of other public agencies, and a comment on the West Virginia compulsory employment law are appended.

Science for beginners, D. FALL (*Yonkers-on-Hudson, N. Y.: World Book Co., 1917, pp. X+382, figs. 231*).—The chief purpose of this first book in general science for intermediate and high schools, according to the author, is not to



give pupils a large amount of information in the natural sciences but to introduce them to the scientific method through the use of which they will acquire the habit of gaining information for themselves. Among others are chapters on science and the scientific method, what the young scientist must learn to do, the soil, and the potato. Numerous practical exercises are interspersed throughout the book.

An outline for the teaching of agriculture in the seventh and eighth grades, C. COLVIN ([*East. Ill. State*] *Normal School Bul.* 57 (1917), pp. 45).—This bulletin contains a suggestive outline, in monthly sequence, in plants and the soil for the seventh grade, and in animal husbandry for the eighth grade, suggested outlines for home projects, and a list of references to helpful literature.

### MISCELLANEOUS.

Thirtieth Annual Report of Louisiana Stations, 1917, W. R. DONSOX (*Louisiana Stat. Rpt.* 1917, pp. 24).—This contains the organization list, a financial statement regarding the Federal funds for the fiscal year ended June 30, 1917, and the State funds for the fiscal year ended November 30, 1917, and a report by the director, including brief departmental reports. The experimental work reported is for the most part abstracted elsewhere in this issue.

Thirty-first Annual Report of Nebraska Station, 1917 (*Nebraska Sta. Rpt.* 1917, pp. LIV).—This contains the organization list, a report of the work of the year, a report of the extension service of the college of agriculture, and a financial statement for the fiscal year ended June 30, 1917.

Monthly Bulletin of the Ohio Agricultural Experiment Station (*Mo. Bul. Ohio Sta.*, 3 (1918), Nos. 6, pp. 168-197, figs. 20; 7, pp. 198-226, figs. 11).—These numbers contain, in addition to several articles abstracted elsewhere in this issue and miscellaneous notes, the following:

No. 6.—Stomach Worms and Tapeworms of Sheep, by D. C. MOTE; Scaly Leg of Poultry, by D. C. MOTE, an extract from Bulletin 320 (E. S. R., 34, p. 85); Spraying for Potato Diseases, an adaptation from Bulletin 319 (E. S. R., 34, p. 53); Spraying for Tomato Diseases, an adaptation from Bulletin 321 (E. S. R., 34, p. 250), and Clover v. Alfalfa, by C. C. HAYDEN, an abstract of Bulletin 327, noted on page 578.

No. 7.—Wireworms, by J. R. STEAR.

Monthly bulletin of the Western Washington Substation (*Washington Sta. West. Wash. Sta. Mo. Bul.*, 6 (1918), No. 4, pp. 45-69, fig. 1).—This number contains brief articles on the following subjects: Farm Accounts, by R. N. MILLER; The Garden in Summer, by J. L. STAHL; Aphis on Farm Crops, by E. B. STOOKEY; Hill Selection of Potatoes with Reference to Controlling Disease, by A. FRANK; Storage of Fruits and Vegetables, by J. L. STAHL; Cost of Raising Cockerels for Broilers, by C. R. SHOUP (see p. 577); Moles and Thrift Stumps, by T. H. SCHEFFER; Warning, by W. A. LINKLATER; Military Training at the State College, by F. T. BARNARD; and Farmer's Excursions to the Station.

## NOTES.

**Kansas College.**—An amendment to the State constitution was adopted at the recent election providing that the legislature may levy a mill or fractional tax to support State educational institutions.

**Kentucky University and Station.**—The food and drug department has been continued, its duties having been absorbed by the State Board of Health, in accordance with a recent act of the legislature. The station continues, however, to perform the analytical and bacteriological work, receiving \$18,000 per annum for that purpose. What was known as the public service laboratories have been organized in the station with J. O. La Bach as director, L. A. Brown as special analytical chemist, and W. R. Pinfield special bacteriologist.

The animal husbandry work, including the departments of beef cattle, sheep, and swine, dairy cattle, horses, and poultry, and veterinary science, has been organized in a single group with E. S. Good as chairman.

J. B. Hutson, assistant in farm management, has been granted leave of absence to enter military service. Recent appointments include L. E. Weaver as assistant extension specialist in poultry, effective September 1; Miss Madge Lemaire as instructor in home economics, effective September 1; and Miss Wendie Harms as assistant in pathogenic bacteriology, effective October 1.

**Marland College and Station.**—Recent appointments include E. C. Auchter, assistant professor of horticulture and assistant horticulturist at the West Virginia University and Station, as horticulturist, and Dr. E. M. Pickens as professor of animal pathology and bacteriology.

**Massachusetts Station.**—Dr. William P. Brooks, agriculturist of the Hatch station during its entire existence and director of the present station since 1906, has resigned and become consulting agriculturist. F. W. Morse has been appointed acting director of the station.

Stuart C. Vinal, assistant entomologist in the station, died of pneumonia September 26, at the age of 24 years. He was a graduate of the college in 1915 and received the M. S. degree in 1917. He was the discoverer of the European corn-borer (*Pyrausta nubilalis*) in this country and was engaged in a study of its habits when stricken with Spanish influenza.

Dr. B. N. Gates resigned as apiarist October 1. Miss Esther S. Mixer has been appointed assistant chemist, beginning September 1.

**New Jersey College and Stations.**—Dr. B. D. Halsted, associated with the botanical and horticultural work of the institution since 1889, died August 27, at 66 years. Dr. Halsted was a graduate of the Michigan College in 1874 and received the degree of Doctor of Science from Harvard University in 1878. He was managing editor of the *American Agriculturist* from 1880 to 1885 and professor of botany in the Iowa College from 1885 to 1889. During his long period of service in New Jersey he became widely known, particularly for his extensive studies of breeding principles carried on with tomatoes, corn, peppers, eggplant, and other plants. He received the silver medal of the Massachusetts Horticultural Society in 1877, and had been an associate editor of the *Flora of North America* since 1905. He was a fellow of the American Association for

the Advancement of Science, president of the Society for the Promotion of Agricultural Science from 1897 to 1899, and of the Botanical Society of America in 1900-01. A large number of articles from his pen have appeared in the station bulletins and reports and in the various scientific journals.

**Ohio Station.**—M. O. Bughy has resigned as superintendent of the experiment farms in Trumbull and Mahoning Counties, and has been succeeded by J. P. Markley, superintendent of the test farm at Strongsville, to which position W. H. Ruetenik has been appointed. W. J. Smith has resigned as superintendent of the county farms in Clermont and Hamilton Counties, and has been succeeded by H. W. Rogers, foreman of the Madison County farm. Elton Mohn has been appointed assistant in farm management.

**Pennsylvania College and Station.**—Fred S. Putney, professor of experimental dairy husbandry, died of pneumonia October 5 at the age of 37 years. Professor Putney was a graduate of the New Hampshire College in 1905, received the M. S. degree from the Pennsylvania State College in 1908, and had just completed the requirements for the Ph. D. degree from the University of Wisconsin. He had also served as assistant in animal industry and general experimental work at the Pennsylvania College from 1906 to 1908, as assistant to the dean of the College of Agriculture at the University of Missouri, and as head of the department of animal husbandry of the Rhode Island College. He had been specially interested in teaching and research in animal nutrition, notably dairy cattle feeding problems, and was the author of numerous publications.

H. P. Cooper, instructor in agronomy, resigned September 5. D. E. Haley, assistant professor of agricultural chemistry, and Miss Julia C. Gray, librarian and editor, have been granted leave of absence. J. H. Muncie has been appointed instructor in plant pathology.

**Rhode Island College.**—C. E. Brett, who has been in charge of the poultry work at the New York State School of Agriculture at Morrisville, has been appointed head of the poultry department. His duties will include both teaching and the supervision of the poultry demonstration projects recently formulated to stimulate poultry and egg production in the State.

**Washington College.**—R. V. Mitchell, professor of poultry husbandry at the Delaware College, has been appointed head of the poultry husbandry department and director of the all-northwest laying contest.

**Wyoming Station.**—D. C. Buntin, a large landholder in the Laramie Valley, has given to the agronomy farm the use of about 60 acres of land, together with water rights therefor. This land is to remain the property of the station as long as it is used for experimental purposes.

**Miscellaneous.**—The patents and copyrights branches have been removed from the Canadian Department of Agriculture and continued in charge of Geo. F. O'Halloron, the former deputy minister of agriculture. Director Joseph H. Grisdale, of the Dominion Experimental Farms, has been appointed acting deputy minister of agriculture.

Two scholarships in agriculture for each State have been established at Notre Dame University by two firms of agricultural implement manufacturers and bankers in different sections of the country.

G. Wery, assistant director of the National Institute of Agronomy of France, has been appointed director, vice Dr. Paul Regnard, retired.

Wade Toole has been appointed professor of animal husbandry and farm superintendent of the Ontario Agricultural College.

The Minister of Agriculture of Holland has brought about the reorganization of the Veterinary College at Utrecht and the Agricultural College at Wageningen whereby these institutions have been made of university rank.

